

Nov 2, 1964

NOTES 11-2-64 BELEW

RL10 ENGINE

The LOX tank of the third Centaur flight vehicle in the current series (AC-4, which is now at the Cape) was over-pressurized during a tanking test. Effects are now being evaluated at Lewis and GD/A to see if this incident will affect the launch schedule for this vehicle. ✓

H-1 ENGINE

Negotiations with Rocketdyne to convert the H-1 production contract to CPIF will be resumed November 4, 1964. ✓

* J-2 ENGINE

The pre-valve failures on the DAC/SACTO battleship stand, ^(OMIT FROM TWX) (reported last week) caused contamination of the engine, and consequently, a rescheduling of the first ignition test. The LOX turbopump, main fuel valve, and both propellant bleed valves have been replaced. The propellant utilization valve and the gas generator control valve have been cleaned and reinstalled. This would normally require pulling the engine; however, due to schedule impact, it was decided to do replacement on the stand. The first tests will be short duration to allow recalibration of the engine. Rocketdyne will be on site in support of this effort. (This route saves 2-3 weeks versus pulling engine.) Present plans call for an ignition firing on Friday, November 6. ✓

PFRT testing is continuing on production engine 2008. Several safety limits tests have been performed satisfactorily, including a 475 second test at high mixture ratio. Total tests to date 10, for a total of 1300 seconds. ✓

First ignition firing of a single J-2 engine on the S-II battleship program is tentatively scheduled for November 7. ✓

* F-1 ENGINE

Two incidents occurred at Edwards Friday night resulting in facility and hardware damage. The first took place on the thrust chamber stand (2A) when an experimental injector (3 Baffle) was bombed; went rough and did not recover in time to prevent burn through of hardware. This is not expected to affect the injector program since the stand is expected to be usable in approximately one week. The second incident took place on engine test stand 1B-1, when at 111 seconds, the run was cut by an observer who saw sizeable movements of the thrust structure. Post-test inspection by the resident project manager indicates a failure of the thrust structure took place. As of this writing no assessment of the situation can be made since a detail inspection of the stand and engine hardware has just begun. Superficially, both engines look undamaged. ✓

The second S-IC-T engine, F-2005, on test stand 1C achieved test objectives on the first acceptance firing with full duration (155.4 sec.), full thrust (1570K) on October 26, 1964. ✓

HHKelle
FYI
B

1. REACTOR CLUSTER TESTING: Tests at Los Alamos with the PARKA and KIWI-Transient Nuclear Test reactors, placed side by side to simulate clustered engines, have shown that neutronic interaction at criticality is insignificant, even at minimum separation distance (six feet center-to-center). ✓ The successful implementation of this test indicates that fully independent operation of clustered engines appears entirely possible.
2. NERVA ENGINE TESTING: The first NERVA Breadboard Engine System Test (NRX-EST) is now scheduled for fall, 1965. This is an acceleration of the original test from spring, 1967, and is possible because of a decision to use an existing test stand, and to fire in the inverted position. Downfiring is paced by the availability of ETS-1 (Engine Test Stand #1), currently scheduled for early 1967. ✓
3. LH₂ ORBITAL EXPERIMENT: The design data book, the definition of the experiment, and the project development plan will be completed and ready for the review meeting on 11-13-64. ✓
4. SATURN IB/MINUTEMAN VEHICLE DEFINITION EFFORT: Representatives of Research and Development Operations (R&DO) and Industrial Operations met with local KSC personnel to discuss the intended work statements to be presented to Chrysler and Martin (Denver) concerning the effects on launch facilities of the strap-on solid motors. Efforts are being made to insure that the separate contracts are compatible and cover all necessary aspects of the problems. The Manned Spacecraft Center (MSC) (Mr. M. A. Faget) has been contacted and informed that certain areas of the strap-on study were of direct interest to MSC and should be discussed jointly with MSC and MSFC. Mr. G. F. Esenwein of the Test Office, NASA Headquarters, was given verbal justification for 200 hours of wind tunnel testing at Ames Research Center. Actual testing was begun on 10-12-64 and is proceeding satisfactorily. Chrysler Corporation and Douglas Aircraft Company personnel have established initial contact with the R&DO Technical Review Panel Coordinator and have been briefed on the Saturn IB/Minuteman feasibility study and on the intended course of the definition phase. Preliminary work statements have been received from the Laboratories and are being compiled into a single document. ✓
5. MECHANICAL SUPPORT EQUIPMENT MISSION CONTRACTS: (Reference NOTES 10-26-64 CLINE, paragraph 3, line 4). The date 12-1-65 was a typographical error. This date should have been 1-1-65. ✓
6. FIRST IGNITION TEST OF S-IVB BATTLESHIP POSTPONED: Due to failure of the LOX pre-valve to open, the test scheduled for 10-24-64 was not attempted. Metal particles (possibly from the LOX pre-valve) were found in the engine LOX pump bearings. The pre-valves (LOX and LH₂) are being reworked and the LOX pump is being replaced. An investigation is underway to determine the cause of LOX pre-valve malfunction. ✓

Tw 1/2

1. S-I/IB

B 11/2

Status of SA-8 - In checkout, and no major problems encountered to date. Checkout 25% complete. ✓

Status of S-IB-I - Cable routing, tubing installation and instrument installation in process. ✓

Status of S-IB-2 - Normal assembly of fairings, spider beam accessories, etc. continued on schedule. ✓

Status of S-IB-D/F (Formerly SA-D-5) - Assembly continuing on schedule. ✓

2. S-IC

"S" Vehicle Forward LOX Bulkhead - After survey by MSFC-Huntsville (P&VE) it was determined that this bulkhead is unusable. Manufacturing Engineering Laboratory will fabricate a replacement bulkhead. ✓

3. NASA ADMINISTRATOR VISITS NEW ORLEANS ON OCTOBER 31, 1964

Harry
Do you think it would do any harm if East fed this info to SIMMS? Reads a lot better than the report about Mr. Webb's alleged statements in New Orleans reported in the Huntsville Times B

Mr. James Webb and members of his staff visited New Orleans, Louisiana. Mr. Webb briefed business, industrial and educational leaders of this community regarding the role that the MSFC and its two subordinate elements, Michoud Operations and Mississippi Test Operations, are playing in the Apollo Space Program. The presentation was essentially the same as the presentation made at Huntsville on October 29, 1964. At the conclusion of the presentation, Mr. Webb held a brief press conference, reiterating the fact that the NASA would analyze the suggestion of Representative Hale Boggs regarding the movement of personnel from the Marshall Space Flight Center to New Orleans. Mr. Webb indicated that the New Orleans community and the State of Louisiana should more aptly concern themselves with the recruitment of additional people to assist the national space program in the New Orleans and Mississippi programs rather than the transfer of personnel from other locations. ✓

Mr. Webb arrived in New Orleans at approximately 4 p. m. from an Inventors Conference in Arkansas and departed at approximately 6:30 p. m. enroute to Washington, D. C. ✓

4. VISIT OF CONGRESSMAN GARNER E. SHRIVER

Representative Garner E. Shriver (R-Kan) visited Michoud Operations as a guest of The Boeing Company on October 26, 1964. Representative Shriver had personally requested to visit the facilities at Michoud Operations and it is assumed that this is due to the relationship of the work being accomplished at Michoud Operations and the work being accomplished in Wichita, Kansas. Wichita, Kansas is in the district being represented in Congress by Shriver. ✓

He was given a general orientation and tour and met the key officials of the industrial firms at the Michoud Operations as well as Dr. Constan. ✓

July

B 4/2

K.D.

NOTES 11-2-64 DANNENBERG

Mr Webb told me the Airforce was stalling since our picture looked better than theirs! B

1. Saturn IB - Titan III Comparison - NASA Hdqtrs. is having major problems in de-bugging its computer cost model. MSFC is being excluded from these operations and technical analysis. Informal approaches are being tried to find out what's going on. Reports to the Aeronautics and Astronautics Coordination Board (AACB) have been postponed. Latest tentative date is during week of 11-2-64.

2. Liquid Hydrogen Experiment at Zero "G" - A Data Book, PDP, and Experiment Technical Definition will be ready at your Dry Run on 11-13-64, for the November Management Council Meeting, all based upon Vehicle 203. Major problem is that TV receivers in Mexico and Bermuda will not have been built in time for that flight. IO is trying to resolve problem with Goddard Space Flight Center. → How about airborne receivers? I think we can easily get 2 air-planes for this mission B

3. Reduction of Documents - Verification of recommended actions of President's Survey is approximately 50% completed and will be reported to Executive Staff on 11-23-64. ✓

4. Joint Operations Group (Apollo) met in Huntsville under chairmanship of Gen. Phillips, with Goddard, OTDA, and MSF Centers participating. Highlight was a presentation by MSF (Christiansen, Holcomb) on a rather complex plan to handle flight missions and an enormous number of planned documents. ✓

Who crashed yesterday ↑

5. Crew Safety Panel met for 2 days in Michoud with Chrysler and Boeing. (Astronaut member was Ted Freeman.) Major difficulties presently are: (1) very short escape warning times due to lower than expected structural limits of IB and V; (2) lack of info on structural limits of S/C; and (3) conflicting interests of crew safety vs R&D regarding one closed (vs open) loop flight of EDS prior to first manned flight. We plan a comprehensive briefing for you. Yes, please B

6. Experiments Coordination Office met with lab representatives on 10-30-64, to screen experiments proposals and arrive at action plan. Marshall Experiments Review Board will meet this week and prepare briefing for you (Nov. 12) prior to meeting of Manned Space Flight Experiments Board in Washington on 11-16-64. ✓

Bonnie

Please ask Bart Slattery + Jack Kuehnert to prepare a suitable condolence letter to Mrs. Freeman B

Tw 1/2

B 11/2

NOTES 11-2-64 FORTUNE

1. Barge Route to Cape Kennedy from MTF can be shortened by dredging out the mouth of Pearl River. Our Monday boat trip indicated how much has been accomplished in shortening the distance from Michoud, but not ~~to~~ MILA. North American had been planning on shipping their stages direct to the Cape after acceptance firing, and John Cully of Boeing told me Saturday night he also was planning this, providing no major modifications were required. Col. Marshall indicated that possibly the dredging might be accomplished under a Public Works Bill to make the West Pearl navigable up to Bogalusa, and was to confirm it this week. ✓

2. President of Mississippi State University visits MTF. Dean Colvard, Dean Simrall from MSU, and Jay Thomas, who is to head up their technical institute on the Coast, spent a few hours with us Wednesday for briefing, tour of the site, and discussions on technical needs, and MDTA training, etc. ✓

3. MTF Planning Board met here Thursday. Heimburg, Shepherd, Tessman and various members of the Working Group and Activation Office participated in our monthly review of construction progress, updating schedules, and review of problem areas. Friday, Heimburg hosted a trip aboard the Army Survey Boat, General Hayes, for as many key personnel from MSFC as could make it. General Wellington, Division Engineer from Atlanta, joined us at Pearlington. Ground and helicopter tours were conducted for all the visitors. ✓

4. Styles moves to halt unnecessary strikes. After several walkouts by the Operating Engineers, without provocation, Paul Styles decided to file an injunction with the NLRB, which will bring contempt proceedings against the local agents if further strikes come about. Col. Marshall at first was opposed to an injunction since he had brought an end to the strike, but went along with the action when it was explained to him. ✓

B11/2

Tw 1/2

1. Orbital Debris: Re: your comments on item 3, Notes 10/26/64 Geissler, copy attached as enclosure 1. State Department is exerting pressure on NASA to protect land from Saturn debris impacts, especially foreign countries. Some foreign countries registered complaints about debris from Atlas Mercury shots. Dr. Mueller felt that by having some orbital debris system aboard, it would be a psychological comfort to both the State Department and foreign countries, regardless of its degree of successful reentry control. A presentation by DAC on the implementation impact of installing the retro rockets on the S-IVB (Saturn IB only) is being planned at MSFC on November 19, 1964. It is not planned that this meeting will include the assessment of (a) reignition of the J-2 engine or (b) use of the APS. These two considerations are being discussed with I. O. and DAC but a complete assessment will take about 6 weeks. A briefing to the Review Board at Washington on the Saturn IB could be given before Christmas but it probably would be best to have a combined Saturn IB and V briefing. The Saturn V debris system results and recommendation are planned for availability in January 1965. Lockheed will terminate their effort on orbital debris system definition after the November 19 meeting. Some Lockheed effort will continue on vehicle breakup and kill probability studies. ✓

2. Trajectory Shaping for SA-501: Present plans for SA-501 call for normal flight into parking orbit. After coasting in orbit, the S-IVB is reignited and follows a non-optimum tilt program which deliberately wastes energy in order to restrict apogee. After coasting through apogee, the SM is ignited to drive the CM back into the atmosphere at the desired speed of 11,033 m/s with a path angle of -7.6° . Studies now in progress are considering "wasting" the energy in the second burn of the S-IVB by performing a plane change maneuver. This has two desirable effects: (a) The guidance equations of the Saturn V are designed to produce an optimum flight path. Therefore, only small changes would have to be made to the equations in order to produce a non-optimum flight. ✓ (b) Making plane change maneuvers allows the recovery area of the CM to be rotated into a more desirable geographic location. ✓ Since the guidance equations of the Saturn V are designed for three-dimensional flight, no changes would have to be made from the program which would be flown on later operational vehicles. ✓✓

3. Vortex Shedding: Re: your question on item 1, Notes 10/26/64 Rudolph: The elasticity of the LUT platforms was taken into consideration in KSC study, and in the current wind tunnel program, only by including the change of the cantilever frequency of the vehicle. The amplitudes predicted are admittedly conservative, but even with lesser amplitudes we may well exceed our design limits. We have a more detailed discussion of the problem attached as enclosure 2.

4. Flight Mechanics, Dynamics, Guidance and Control Panel: This panel met at MSC Sep. 21, 22, and 23, 1964. Most significant meeting highlight was MSC's relinquishing of the mandatory requirements for recovery of the command module in case of abort of 201. Additional highlights given in enclosure 3. ✓

E.G.
See my remarks on
enclosure. Agree? B

Vortex Shedding - (Reference Notes 10/26/64 - Rudolph)

KSC Memo TR-89 is primarily concerned with the design of umbilical arm dampers and other fixes, and, therefore, estimates maximum values of response as a basis for design. This conservative analysis assumes that the vehicle will be forced at a characteristic wind velocity of 36 knots which will produce a self-excited oscillation of the vehicle. The maximum oscillatory lift coefficient is taken as 0.3, the lift force is assumed to be perfectly correlated over the S-I⁹ and S-II stages and the structural damping is taken as 1½% of critical. Previous wind tunnel tests have indicated that a self-excited response is obtained only for damping less than 1% and, therefore, if the vehicle LUT combination has a damping value from 1½ to 2%, the large amplitude response should not be obtained; however, the response amplitude might well be more than ± 10" and the allowable base bending moment might be exceeded. The KSC memo was based on the Martin-Denver dynamic analysis of the LUT and thus included the elastic characteristics of the LUT; however, there is no rational way to estimate the damping of the vehicle-LUT combination including attachment of the umbilical arms to the vehicle. Current wind tunnel tests at LRC of Saturn V indicate that an excessive response is obtained at several wind azimuths with 2% of critical damping and the allowable base bending moments are exceeded. An aerodynamic fix was obtained which is effective for a 1% damping value; however, this fix is probably impractical. It consists of three helical spoilers projecting one-tenth of a vehicle diameter and spiraling down the S-I and S-II stages. Tests will continue for another three weeks and additional "fixes" will be investigated. After this, a more detailed presentation may be in order.

ENCL

2.

E.G. Sounds rather
disquieting!! B

Jim

R-AERO-D

October 30, 1964

The Tenth Meeting of the MSC-MSFC Flight Mechanics, Dynamics, Guidance and Control Panel was held. It was combined with an informal conference of the panel and subpanel chairmen and a meeting of the Guidance and Performance Subpanel. Highlights of the meetings were:

Agreement on the MSFC proposed mission profile for 201, subject to updating when the latest vehicle characteristics become available. MSC relinquished the mandatory requirements for recovery of the command module in case of abort and thus saved us considerable work load and a possible schedule slip. ✓

For 202 and 203, it was agreed to use our Chrysler calculated trajectories as starting point for final mission definition. ✓

In the general area of responsibilities of the centers in the flight mechanical area (establishment of mission constraints and Interface Control Documents) no agreement was reached yet. However, a good start was made, and a preliminary information and work flow chart was agreed upon. The principle, that both centers would work as partners, rather than in a customer-vendor relationship, WAS ESTABLISHED. ✓ Intermediate contacts and a meeting between the co-chairmen and a few appointed panel members in 4 to 6 weeks was planned. ✓

ENCL 3.

1. S-IU-8 INSTRUMENT UNIT CHECKOUT: The S-IU-8 Instrument Unit was released to this Laboratory for final checkout on October 28, 1964. Electrical and mechanical continuity testing is in progress. ✓
2. S-IVB BATTLESHIP: Battleship test at SACTO scheduled for October 24, 1964, was postponed due to malfunction of the LOX pre-valve. Ignition was not attained. Investigation of the LOX pre-valve revealed the lip seal was damaged, and contamination was found in the LOX suction lines. Rework is in progress, with the test now anticipated this week. ✓
3. S-IVB RELIABILITY PROGRAM: DAC is progressing satisfactorily on the Formal Reliability Program Plan. Expected completion date is late December. Coordination of the LH₂ Orbital Experiment on S-IVB Stage 204 revealed that this experiment should be covered by the Intermediate Reliability Program Plan with no additional costs. ✓
4. MANNED FLIGHT AWARENESS: Mr. Eugene Buhmann who is the Laboratory representative to the Manned Flight Awareness Program attended the second major contractor conference at Michoud. The highlight of the conference was a presentation by GD/A on their "Craftsmanship" program. This is a Post-Mercury program to maintain the high standards they developed during the manned program. In the first nine months of this year, the "Craftsmanship" program has, through reduced rejection rates, scrappage, rework, etc., saved the company \$903,000 at a cost of less than \$5,000 excluding the salary of one man full time and others part time. Yet our major contractors expect to be paid additionally for their efforts in this program. ✓
5. NASA INSTRUMENTATION WORKING GROUP VISIT: Eight members of a NASA Instrumentation Working Group visited the pressure calibration facility of this Laboratory and were given a demonstration of the various standards used. Langley, Ames, Lewis, and the Air Force facility at Tullahoma were represented. They extended an invitation to the Laboratory to participate with the group which meets on a semi-annual basis to discuss instrumentation problems on material interest. ✓

Ed O'Connor
FYI
B

NOTES 11/2/64 HAEUSSERMANN

Tw 1/2
B 11/2

1. STATUS OF MOD II SWITCH SELECTOR: The initial packaging design of the Mod II Switch Selector has been agreed upon and the parts selection is approximately 95% complete. Thermal and environmental analysis is in progress and finalizing the specifications will be completed within one week. Circuit analysis has been completed and a few changes were incorporated to further improve the reliability of the unit. The switch selector program is on schedule at the present time and no delay is anticipated. ✓

2. RADIATION TESTS: Two command voltage demodulator amplifiers and five polarized tantalum capacitors were subjected to nuclear radiation tests at the Georgia Nuclear Facility, Dawsonville, Georgia. The two amplifiers were identical except one used 2N2102 output transistors and the other used 2N2034's.

A constant temperature was maintained throughout all testing as the test specimen was subjected first to gamma radiation, then to both gamma and neutron bombardment. The amplifiers and capacitors withstood the gamma tests without serious deterioration. Under combined gamma and neutron bombardment, the 2N2102's outlasted the 2N2034's. These voltage demodulators were tested to 4×10^{13} n/cm² and 6×10^5 Roentgens (combined). This environment is many times greater than the IU environment anticipated for ^{a nuclear} ~~our RIFT~~ vehicle. This particular test is one of the many Astrionics has performed at Dawsonville during the last year. A summary of our radiation tests' activities will be included in one of our weekly notes during this month. ✓

Tw 1/2

B 11/2

NOTES 11/2/64 HEIMBURG

1. F-1 TURBOPUMP TESTING: The initial test at the F-1 Turbopump Test Facility was successfully conducted on 10/30. ✓ This test consisted of a scheduled two-second firing. LN₂ and RP-1 were used as the pumping media for the lox and RP-1 pumps, respectively. Propellants for the gas generator were provided from the high pressure facility run tanks. The objectives of this test were: (1) to checkout the facility and bobtail engines; and (2) to investigate the temperature spike and r.p.m. buildup through the first step of the turbopump buildup transient period. All systems operated satisfactorily. ✓

2. TEST LABORATORY FACILITIES - WEST AREA: (Reference NOTES 9/21/64 HEIMBURG, copy attached.) Reprogramming of funds is complete. Correction of deficiencies is proceeding with the F-1 stand to be taken over by Test Lab on 11/23. The main stiff-leg derrick will be returned to us in time to prevent any delay in installation and checkout of the holddown hardware. Redesign of the propellant systems is complete. Construction completion date will be known in about two weeks; however, this delay will not adversely affect the overall activation schedule. ✓

*1w 3. S-1 STAGE: S-1-10 was removed from the Static Test Tower East on 10/29. Loading on the barge is scheduled for 11/3. ✓

4. S-II BATTLESHIP (SANTA SUSANA): The "dry sequence" has begun, but electrical problems have caused a hold for trouble-shooting. All work items will be completed during this hold period. The test stand conductor has set guards to keep unnecessary people off the stand during the sequence test. ✓

5. S-IVB: Considerable difficulties have been encountered with contamination in the stage lox and LH₂ systems. Both are being recleaned. The lox pump was exchanged because of this problem. Also, both lox and LH₂ prevalues failed under cryogenic conditions. It seems that DAC carried over too much from S-IV battleship experience (same design, same company, same result). Agreement has been made to allow DAC to bypass ignition test and proceed to 10-second firing. ✓ This decision is based on the fact that the ignition test is not much less hazardous than mainstage firing; therefore, time can be saved. ✓ DAC proposal to make an ignition test, then turn right around and fire in the same day, in our opinion, creates a risk because of the short evaluation time allowed. This agreement is with the restraint that lox and LH₂ prevalues demonstrate satisfactory performance under cryogenic conditions prior to firing. This test is presently scheduled for 11/6. ✓

ATTACHMENT 1: NOTES 9/21/64 HEIMBURG (To Dr. von Braun's & Mr. Weidner's copies)
ATTACHMENT 2: Note to Dr. von Braun & Mr. Weidner only (with NOTES 9/28/64 as an enclosure).

B11/2

July

1. REQUEST FROM KENNEDY SPACE CENTER (KSC) FOR SYSTEMS ASSISTANCE:

At the request of Mr. Guthrie, Chief, Management Analysis Office, KSC, Mr. Gibbons, Engineering Systems Branch, Computation Laboratory, made a presentation to key KSC management personnel on the MSFC Prepost Inventory Control System which is being developed for Technical Materials Branch.

At the conclusion of the presentation, Mr. Guthrie proposed that the system, as designed, be adopted and utilized to support the KSC supply operations. Those in attendance concurred in his proposal and it was agreed that a presentation would be made at the next Director's Board Meeting with a recommendation that necessary computer hardware and terminals be procured to allow adoption of the system. ✓

2. CONFIGURATION MANAGEMENT BRIEFING: On Tuesday, October 27, 1964, the Computation Laboratory briefed Dr. Mrazek and his Ad Hoc Committee on Configuration Management. The presentation covered the automatic data processing implications of the Apollo Configuration Management Manual (500-1) and how the Computation Laboratory's MSFC Data Center can help with its implementation. The scope and direction of Data Center work on 500-1 was given Committee approval. Based on the good reception of the presentation by the Committee, the Computation Laboratory will exert additional effort in this vital area. ✓

3. AUTOMATIC CHECKOUT SUPPORT:

The Computation Laboratory has recently been directed by the Chairman of Automation Sub-Board #4 to undertake the development of an Advanced ATOLL (Automatic Test or Launch Language) for use in the programming of automatic checkout and launch procedures. This memorandum, dated October 1, 1964, is one of several issued during the past six months assigning additional responsibilities to the Computation Laboratory in the area of computer program design and implementation for automatic checkout of flight equipment.

It is required that the Advanced ATOLL be completed in time for use in the checkout of 501. It is estimated that approximately 32,000 man-hours or 16 man years will be required for the complete performance of this task. Steps are being taken to request additional in-house contractor support to allow for these increased man-power requirements. It is quite likely that a portion of this effort would be sub-contracted to Mesa Scientific Corporation since they are so heavily involved in the specifications of the launch site requirements.

Very Mac
Do you
concur
with this
approach?
B

NOTES 11/2/64 JAMES

B 11/2

*fw SA-9: The S-I-9 and IU-9 arrived at KSC Friday night. The S-I was transported to the pad early Saturday morning and the IU was taken to the hangar. No problems were encountered. ✓

S-IV-10: A meeting with the Static Firing Working Group and other R&DO personnel to determine the feasibility of eliminating S-IV-10 Acceptance Firing will be held today. ✓

*fw PEGASUS: Pre-prototype Testing - The pre-prototype electronics canister was shipped from Bladensburg to Hagerstown last weekend as scheduled. This canister has been installed into the prototype structure and preliminary electrical and functional tests have begun. The formal Acceptance Test Procedure (ATP) should begin next week as scheduled. Upon successfully completing the ATP, the pre-prototype canister will be returned to Bladensburg for up-grading to prototype configuration and further tests. ✓

S-IB SPIDER BEAM: CCSD conducted structural tests on selected sections of the damaged spider beam. These tests confirmed suspicions that the beam will not qualify at the design loads. CCSD has made a preliminary proposal to design a fix which will reinforce the webs of the chordal beams to provide additional stiffness to the webs and change the load paths to relieve some loads through the brackets. CCSD has been authorized to incorporate this fix on the test beam and conduct isolated tests to confirm. If this fix is confirmed, it will be incorporated as a "mod kit" on the existing and subsequent spider beams. If the fix is finally approved, CCSD states that there will be no effect on the delivery schedules and only 70 pounds will be added to the beam weight. ✓

S-IVB BATTLESHIP: (DR. MRAZEK) After thorough discussions with R&DO laboratories (Mr. Driscoll, Test Laboratory, and Mr. Paul, P&VE Laboratory), it was decided to go right away into the 10-second firing test, eliminating the ignition test. ✓

SATURN IB MECHANICAL SUPPORT EQUIPMENT MISSION CONTRACT: Reference: Mr. Cline's Note (10/26/64), copy enclosed to Dr. von Braun. The MSE effort with CCSD was initiated under a Task Order on August 1, 1964. On October 16, 1964, this office was informed by I-CO that this Scope of Work could not be incorporated into the CCSD contract by Change Order and that a supplemental agreement approach would have to be used. On October 20, a 120 day extension to the Task Order was issued. Due to time required for preparation of proposal, negotiations, and the work load of I-CO, it is estimated this effort will be finalized as a supplement to the CCSD contract approximately January 15, 1965. It should be noted that 90% of the total mission effort, as covered in the Task Order, is now underway.

Encl
Hellebrand
P&VE

Who
geofed
here?

B

Ed
O'Connor

FYI

B

NOTES 11-2-64 KOELLE

1. FIRST REVIEW ON LOW ACCELERATION SPACE TRANSPORTATION SYSTEM

STUDIES: The first review meeting on Low Acceleration Space Transportation System Studies (P-174) was held on October 27, 1964 at United Aircraft facilities in Hartford, Connecticut and on October 28, 1964 at GE facilities in Valley Forge, Pennsylvania. ✓

The results presented show that the United Aircraft team is stronger in trajectory work, whereas the GE team is better from the overall system design point of view. The unique feature of the study is the combination of optimized high thrust hyperbolic injection from Earth orbit with subsequent low acceleration flight phase. For a typical Mars mission, this reduces the required 30 to 50 MWe power system for pure low acceleration system down to 3 to 5 MWe for the hybrid high-low acceleration propulsion mode.

2. IEEE 11TH NUCLEAR SCIENCE SYMPOSIUM: Dr. Ruppe was invited to organize (and chair) two sessions for the IEEE 11th Nuclear Science Symposium in Philadelphia. He prepared the following program which will be published in full early next year:

High Acceleration Missions (October 29)

C. Schwenk
D. Knapp
J. Nance
J. Whiton
H. Radd

NPO
Douglas
GD/Atomic
MSFC
Lockheed

Solid Core Engines
Liquid/Gas Core Engines
Pulse Engines
Isotope Heated Engines
Mission Studies

Electric Power (October 30)

R. Seitz et al.
F. Schulman
J. Teem
T. Edelbaum
V. Gradecak

MSFC
OART
Electro-Optical Systems
UA/Research
MSFC

Internal Power Requirements
SNAP Systems
Electric Thrusters
Electric Missions
Unconventional Approach

HHK
→ Do you include "poodle" type
low-acceleration propulsion in these studies?
B

Tw 1/2

B 11/2

NOTES 11-2-64 KUERS

Arthur
Rudolph
Mark
Urlaub
Your
comment
is
invited
B

1. Bulkhead Fabrication for S-IC at Michoud: The fabrication of bulkheads by Boeing is not successful at the present time. The Boeing Company has to deliver three complete bulkheads to MSFC, one each for -S, -1, and -2. The quality of the first two bulkheads (-S and -1) was such that they could not be accepted or repaired and had to be scrapped. The major reason for scrappage was mismatch in welds and "canning." Several factors contributed to this unsatisfactory result. We do not direct the Boeing Company to copy our welding processes and techniques; they selected to develop their own techniques, and they have capable people in their methods development organization. However, they failed to make sufficient use of experience gained at MSFC. In spite of all training and help we have given them, the skill of their crews at Michoud is not yet the level required. I have agreed with Mr. Coenen to provide in the future more direct help and advice in Michoud.

A number of components such as Y-rings, dollar pieces, and some gores can be salvaged from the scrapped bulkheads. Because of the urgency of the -S bulkhead---it is several months overdue---we decided to build this dome here at ME Laboratory. We think we can absorb this work here since we are already working on the last gore segments for flight #2. ✓

2. Statistics for Engineering Changes for S-IC:

As of October 23, 1964, the following EO's have been received:

| <u>Category</u> | <u>Number of EO's</u> |
|------------------------|-----------------------|
| 5001 (Paper Change) | 4149 |
| 5002 (Hardware Change) | 21220 |
| 5003 (Instrumentation) | 4 |
| 5004 (GSE) | 8213 |
| 5005 (MSFC Generated) | 141 |
| Generated by CAM's | <u>4708</u> |
| TOTAL | 38435 ✓ |

B 11/2

7/11/2

1. VISIT OF EARL HILBURN - We are preparing a letter to Mr. Hilburn for your signature to confirm November 16 as the date for his visit to Huntsville and November 17 to Michoud. Mr. Hilburn's expressed purpose in this visit is to discuss planning, scheduling, and monitoring of the work being done at Huntsville, Michoud, MTF, and the major contractors, to get a first-hand appreciation for the project management process as it has been developed by MSFC. ✓

Bonnie
I'll be in
Washington
that day.
Is that
o.k.
with
him?

2. MSF PROGRAM SCHEDULING SYSTEM - The pilot test of the proposed MSF Program Scheduling System, which includes a Top Level Apollo Network and machine generation of schedule milestone charts, is on schedule and MSFC input data for the trial computer run is being delivered to MSF this week. Tom Smith will be participating in the review and evaluation of test results. ✓

(His impressions
are vitally
important
to MSFC!!)

3. APOLLO EXTENSIONS AD HOC COMMITTEE - The proposed Apollo Extensions program worked out by the Ad Hoc Committee (Executive Staff members are Bud Abbott and Ray Butler) at the request of Dr. Seamans has been incorporated into the MSF FY66 budget request. As it presently stands, the proposal (thru 1971) includes:

So they
accepted
my
suggestion
after all!

A nominal Apollo Manned Lunar Landing Program of 8 Saturn IB and 9 Saturn V vehicles, including the development of the Saturn IB/Centaur for the cislunar Pegasus, and an LH₂ experiment on SA-203, ✓

An Apollo Extension Support (AES) program of 12 Saturn IB and 10 Saturn V missions covering earth orbital, lunar orbital and lunar surface exploration missions, and ✓

An unmanned program consisting of 10 Saturn IB/Centaur and 3 Saturn V earth orbital and planetary missions. ✓

The basic approach and philosophy behind this proposal has been agreed to by Dr. Seamans and Mr. Webb, and the final product will probably vary only in how many and what type of specific missions will be included. We are preparing a presentation for you that will cover this subject in complete detail. *Please do. I'm greatly interested.* B

H.M.

4. SUBMISSION OF NASA FY66 BUDGET TO BOB - At the direction of Dr. Seamans MSF has revised their FY 66 budget estimates to include the Apollo Extensions Program described above. ✓ The additional FY65 and 66 funding requirements to support this program (about \$42M in FY65 and \$77M in FY66) are planned to come from existing funds and therefore will not affect the MSF FY65 and 66 ceilings. The MSF FY 66 ceiling guideline is \$3.294B based on a NASA budget of \$5.565B vs. a BOB guideline of \$4.85B. The revised MSF FY 66 budget was reviewed with D. Wyatt on Oct. 31 and is scheduled to be reviewed with Dr. Seamans today, Nov. 2, along with the other program office submissions. The final NASA FY66 budget is scheduled to be presented to BOB prior to November 16. ✓

tw 14/2

NOTES 11-2-64 McCartney

B. 11/2

Negative Report

B 11/2

1. Qualification Test Program - (Reference your remarks on Mr. Heimburg's notes 10/26/64, copy attached) Mr. Howard Burns, Chief of my Test Office, is prepared to brief you at your convenience on the total Saturn V Qualification Test Program.

Bonnie Please arrange B

*fw 2. S-IC Stage:

a. S-IC-S Upper LOX Tank Bulkhead being built by Boeing Michoud has been scrapped due to poor quality. A decision has been made to fabricate a replacement bulkhead at the MSFC Manufacturing Engineering Lab. All parts needed for the bulkhead fabrication are available at Michoud and will be shipped to MSFC immediately. ✓

b. S-IC-T Manufacturing is still proceeding 19 weeks behind schedule. The shortage of parts for the thrust structure continues to be the pacing item. If the shortage continues, MSFC will be faced with a difficult decision between delaying the joining operation with the fuel tank until parts arrive or making the joining operation and later installing parts within the horizontal assembly position. Either alternative could cause additional slippage.

*fw 3. S-II Stage:

a. S-II Battleship Status - Continuity checks have been completed and the integrated checkout (sequential countdown) is now in process. Since tanking tests have not yet begun and practically a day-by-day slip has occurred during the last week, it does not appear feasible that the first battleship firing can occur prior to Friday, Nov 6, 1964. ✓ (Sat Nov. 7)

*fw b. S-II Split Aft LOX Bulkhead (S-II-S) - On Tuesday, 27 Oct 64, a hydrostatic test was being performed by S&ID on the LOX Bulkhead as a final component test prior to welding to the common bulkhead assembly. Failure occurred at 52 psi. The maximum test pressure for this hydrostatic test was 70 psi; therefore, failure occurred at approximately 70% of the test pressure. The failure started in the parent material near the dollar weld area and the rupture ran through eight gores. S&ID has initiated a task team to review all traceability, inspection, and record data of material for hardness and quality and at the same time will review the design. The next bulkhead in the manufacturing process (S-II-T) is approximately six to ten weeks down stream. An investigation will be made as to what can be done to accelerate it.

4. S-IVB Stage Sectional Mockup - Technical evaluation of the DAC cost proposal for the sectional mockup of the S-IVB Stage for the MSFC Breadboard has been completed. Tentative plans are to begin negotiations at DAC on Nov 9, 1964. ✓

1 Attachment:

Notes 10/26/64 Heimburg (to Dr. von Braun & Mr. Weidner's copy only)

A.R.
Please add absolute dates to such statements in future NOTES. (I don't know your reference line)
B

A.R.
I hope the next one will not only be on time but also capable of faking the test pressure!!
B

Tw 1/2

B 11/2

NOTES-11-2-64-SHEPHERD

Visit of Teague Committee Representative: Lt. Col. Harold Gould, Staff Advisor to the Teague Subcommittee, is to visit all of our sites prior to the first of the year. His schedule is as follows:

| | | | |
|--------|------------------------|------------|-----------------------|
| Nov. 2 | Seal Beach | Nov. 19-20 | MSFC |
| | Downey | Dec. 15 | Slidell & Michoud |
| Nov. 4 | Edwards Air Force Base | Dec. 16 | Mississippi Test Fac. |

Lt. Col. James Barnett, Chief, Facilities Projects Office, is to accompany Col. Gould during his entire visit. Col. Gould held this position during the FY-64 hearings and caused MSF and MSFC considerable difficulties. He replaced Col. Dyer, who served during the FY-65.

We are approaching his visit very straight forwardly but do not intend to raise any problems with him. Recognizing the position that he occupies and the influence he has on our program, I recommend that during his visit to Huntsville he meet with you for 5 to 10 minutes.

Boonie Please arrange B

General Welling's Visit: Your meeting with General Welling on October 27, has served a very useful purpose. Your statement to the effect that the S-II Test Stand construction at Mississippi was on the critical path made quite an impression on him. As a result, Gen. Welling is having the Mobile District Engineer conduct a "Status Seminar" on the construction at MTF on November 30 through December 1. The purpose of this is to review and demonstrate to Gen. Welling's satisfaction, the ability of the Corps of Engineers and construction contractors to meet the S-II schedule. Gen. Welling is insisting that the principals of the construction contractors attend the meeting in person. This includes representatives from: Leslie Miller - Powers Engineering Company and Donnivan Construction Company, Paul Hardeman Construction Company, C. H. Leavell & Peter Kiewit, Hyde Construction Corporation and Thornton Construction Company Inc., Farrell Construction Company, Morrison-Knudsen Company, Warrior Constructors, Chicago Bridge & Iron Company, Broadway Maintenance Corporation and Glantz Construction Company, Nordberg Manufacturing Company, and Chaney and James.

Jim Sh.

Let us include the installation people in this. I don't worry so much about the brick & mortar schedule, as about the installation of measuring equipment, control racks, closed-loop TV and the like. Please contact Henry Anter.

P.S. The S-II facility includes, of course, pertinent parts of blockhouse and data acqu's. facility.

7w 11/2

B 11/2

NOTES 11-2-64 Stuhlinger

1. PEGASUS PRESENTATIONS: Dr. Johnson and I gave presentations on the status of Project Pegasus to Dr. Mueller, Dr. Bisplinghoff and other members of OMSF and OART last Monday. On Wednesday, Drs. Mueller and Bisplinghoff decided to go ahead with Pegasus launchings on Saturns 9, 8, and 10, essentially as proposed by MSFC. ✓

2. PEGASUS PAYLOAD FOR SATURN IB: Ed Gray requested Dr. Johnson's and my viewpoints regarding the applicability and necessary modifications of a Pegasus payload for a Saturn IB-Centaur flight to the vicinity of the moon. A study with a similar objective is presently underway at Martin-Baltimore, sponsored by OART-Langley. Much of the study work done earlier this year by FSC and the Pegasus Project Office on the "High Altitude MMC on Saturn 10" applies directly to this problem. We gave brief answers last Thursday. A copy of my telephone transcript was sent to you for your information. ✓

E. S.
Request
short
briefing
B

3. AES PAYLOADS: Recent shifts in emphasis have been made by Dr. Seamans, Dr. Mueller, and others concerning AES payloads. It appears that a LEM/Shelter is now preferred over the LEM-TRUCK/MOLAB for early AES missions. The Shelter will carry a scientific payload mass of about 1100 kg, possibly including a small roving vehicle without pressurized cab. More laboratory equipment could be incorporated into the Shelter than in the MOLAB, including probably a small telescope. Indications are that FY-65 funding for scientific equipment will not be cut from its present \$1.8M. ✓

4. MSF FY-65 PROGRAM: Mr. E. Z. Gray clarified the MSF Program by telephone on October 29. He stated that we must stay within the \$19M guidelines previously established. From this amount, \$2M were assigned to the 100 # Thruster Program, and \$4M to AES (de Fries). ✓ He requested that the program be reviewed again, including those tasks already approved, to assure that the funds were assigned to the highest priority work. ✓

NOVEMBER 9, 1964

B 11/11

F-1 ENGINE

Engine F-2004, previously allocated for the SA-500-T, has been reallocated as one of the two engines to be used in the FRT test series. This assured us of starting and completing the FRT series on schedule. The reallocation was possible due to the lack of immediate need for one engine at MSFC, particularly since F-2005 will be delivered this month. ✓

Test stand 1B-1 incident - A structural failure of the thrust structure occurred during gimbaling exercises on engine 023. Preliminary inspection revealed no engine damage. Failure is now attributed to bad welds of the lateral load cell ties. Full analysis of the stand is underway (thrust alignment verification, etc). Down time is estimated at four to five weeks. No impact in either deliverable engines or FRT is anticipated, since fortunately, two of the new test stands are completely operational. ✓

RL10 ENGINE

Loose pump inducer locking screws were found on several RL10 engines in the field last week. An x-ray procedure has been developed and is being used to check this condition on assembled S-IV and Centaur stages. X-ray results on Centaur vehicle #4 were negative. S-IV-8 and S-IV-9 engines will be checked in this same manner. Lock washers have been redesigned to prevent this occurrence.

We are procuring five R&D type RL10A3-3 engines (Increased Isp RL10 engines) this week; two for ground test, two for flight on Centaur vehicle #11, and one spare. (These engines will be procured by changing the specification on five of the RL10A-3-1 engines previously on order.)

The first Centaur "two-burn" mission (AC-4) is still scheduled for mid-November despite the LOX tank over-pressurization reported last week. ✓

H-1 ENGINE

The H-1 Engine Production Contract (NAS7-162) was successfully converted from Cost Plus Fixed Fee to Cost Plus Incentive Fee. ✓ Negotiations were completed November 6, 1964. ✓

→ L.B.
Please give me some details on the incentive formula finally agreed upon

J-2 ENGINE

The first S-IVB battleship firing was accomplished Saturday night, November 7. The engine was automatically cutoff at one second after mainstage signal by the gas generator over temperature cutoff device. A cursory post-test examination revealed some erosion in the gas generator control valve LOX pressure transducer fitting. As this engine has an aluminum sleeve for the LOX poppet, it is suspected that the sleeve is eroded also, which led to a LOX-rich mixture ratio; thus the over temperature cutoff. A detailed inspection of the gas generator and control valve is scheduled for today. If the gas generator combustor body is not eroded, the gas generator control valve, and possibly the gas generator injector, will be replaced and another firing conducted later this week. ✓

The S-II battleship single engine firing is scheduled for this week. ✓

Engine 2012, a non-fireable flight engine, was delivered to DAC on November 3. It will be replaced in January with a fireable flight engine for 201. ✓

NOTES 11-9-64 CLINE

B 11/11

1. SATURN IB/MINUTEMAN: A preliminary Statement of Work for the Saturn IB/Minuteman definition phase has been compiled and distributed to the Laboratories and Chrysler Corporation for review and comment. All in-house effort is proceeding according to schedule and no delays are anticipated at this time. ✓

B 11/11

1. VISIT OF NASA DEPUTY ASSOCIATE ADMINISTRATOR

Mr. Earl Hilburn, NASA Deputy Associate Administrator, will visit the MSFC/Michoud Operations November 17, 1964. A detailed itinerary has been forwarded to Mr. Kline. ✓

2. VISIT OF MR. EARL W. COOPER, SENATE STAFF MEMBER

Mr. Earl W. Cooper, Senior Staff Member, Senate Appropriations Committee, and his wife visited the MSFC/Michoud Operations on November 8, 1964. He was given an orientation tour and briefing regarding MSFC/Michoud Operations. ✓

3. ECONOMIC IMPACT OF THE MICHLOUD PLANT ON THE NEW ORLEANS AREA

Dr. P. F. Boyer of Louisiana State University has begun a study on the economic impact of the Michoud Plant on the New Orleans area, and we have furnished him with basic data concerning personnel, total payroll, etc., for 1962, 1963, and 1964 to date. ✓

4. CCSD

Status of S-IB-1 - Cable installation, routing and wrapping in all areas is progressing. Engine area cables, area 1 through 8, are partially routed and properly stored, pending reinstallation of engines in shop 1800. Continuity and meg started where cable installation complete. Modification and process sheets being worked throughout vehicle. ✓

Status of SA-D - CCSD in process of assembling and installation of prevalves. Engines have been installed. Wraparound lines being connected. ✓

Status of S-I-8 - Approximately 43% of the post-static checkout of S-I-8 is complete and testing is continuing with no major problem areas. Mechanical tests are 90% complete, Measurements 37% complete and R. F. Systems tests, with the exception of T. V. System, are complete. ✓

NOTES 11-9-64 DANNENBERG

B 11/11

1. Liquid Hydrogen Experiment at Zero "G" - Re Notes 11-2-64
Dannenberg (Attachement 1), your question, "how about airborne receivers?" - it appears that airborne receivers do not have enough gain for the experiment. Mr. Hoberg will give you a complete report at your dry run on 11-13-64. ✓
2. Experiments Review Board - met 11-5-64, and decided to pursue the following experiments: Orbital propellant behavior and transfer; Nike X radar target; materials behavior; extremely low frequency radiation; density measurement; optical technology satellite; energy conversion satellite. You will be fully briefed 11-12-64. The Nike X experiment is the only one ready at this time, if DOD proposes it officially. (see next item) ✓
3. Nike X - Calibration Sphere Payload for SA-10 - In response to AMC request, preliminary feasibility study by R&D indicates that we could carry a secondary payload on SA-10 of the following characteristics: 1 meter diameter, 1,000 days nominal lifetime; 525 lbs, including ejection devices. Impact on schedule and manpower is not clear at this time. *That's in addition to Pegasus C B.*
4. R&D Operations Support of Resident Offices - Policy has been drafted based on MSFC Management Policy #3, essentially as follows: After design concept and definition phase has produced specific approved contract end item specifications, authority for approving certain level of changes delegated to Resident Offices will be supported by equivalent delegation of technical responsibility to Laboratory Field Representatives, who report to the Resident Office. ✓
5. Saturn IB and V Flight Readiness Study - NASA Headquarters has agreed to fund a GE (Huntsville) effort in the area of Manned Flight Readiness Criteria. ✓

Bornie

Bh
Didn't get the notes until 11/16/64.
I hope these 2 briefings were
included in the MSFC dry run.
Rob
11/16

1 Attachment

Please make sure that I don't miss
these 2 briefings B
(Briefing ① is part of Mr. Swalley's briefing during dry run)

1. Activation Proceeding - Monday, our representatives joined those of the Corps of Engineers for pre-final inspection of the Warehouse and Site Maintenance Buildings. Beneficial occupancy of office space in Site Maintenance Bldg. will alleviate our interim office space shortage. Our bi-weekly Management Meetings with GE are resulting in better acceptance and implementation of our philosophy on controlled manpower build-up. ✓ However, need for realistic stage schedule dates are becoming more and more critical, and the Stage Manager's Offices must keep us closely advised, and the Stage Contractors in check, to avoid over-staffing available facilities. Additional civil service personnel are now required by MTO in order to maintain orderly buildup. ✓

2. Mississippi Research and Development Council - Met in Jackson for organizational planning Thursday a.m., 5 November. The Governor explained how Stanford Research Institute had studied the state's economic needs and proposed legislation to establish a Research Institute which was subsequently passed; how the major industries and NASA had already helped, and of your promised support in the future; and how the Council proposed to guide its programs. He was grateful for my being there as NASA Coordinator, and indicated that he would do as much as he could to help our Regional-Planning efforts. Mississippi's standard industrial wage of only \$76.80 per week (verses National average of \$105.99) was noted, and the computerization of all state, county, and local records was made an early objective. Technical education was stressed. ✓

3. Consent decree filed in 5th Circuit Court by NLRB - to formalize Paul Styles' agreement that Local 624, Operating Engineers, would observe National Labor Relations Act in the future. This in effect makes the local leaders immediately subject to Court action if they repeat secondary boycotts, or other unfair labor practices they have instituted in the past. Styles acted after he felt the Corps of Engineers was not proceeding vigorously enough to stop numerous, unwarranted walkouts and strikes. ✓

B 11/11

NOTES 11-9-64 GRAU

1. S-IU-8 INSTRUMENT UNIT CHECKOUT: The S-IU-8 Instrument Unit was installed on the Motion Simulator unit November 5, 1964, and is undergoing preparation for cooling test. ✓
2. IBM INSTRUMENT UNIT FACILITY: This Laboratory began transfer last week of the first of the GFE which we are responsible for providing IBM. Our resident representative moved to the IBM plant today. ✓
3. S-IVB STAGE: The Lox pre-valve on the Lox feed system of the S-IVB Battle-ship stage required cleaning and several parts including the pump had to be exchanged. This Laboratory is presently making a reliability analysis of an alternate J-2 Engine Chilledown system proposed by DAC which they claim will increase the reliability of the S-IVB Stage. ✓
4. S-IC GSE INSTALLATION: Boeing has begun installation of the S-IC GSE in this Laboratory. The first run of the Functional Test Procedures for the Digital Data Acquisition System ground equipment is in process with laboratory personnel participating. Results so far are considered satisfactory. ✓
5. UNSATISFACTORY CONDITION REPORT (UCR) SYSTEM PROGRESS: Personnel of this Laboratory visited DAC in Huntington Beach last week to work out final computer programming details for the proposed transmission of failure reports, failure analysis reports, and corrective actions to MSFC. This failure information will be incorporated into the UCR system at MSFC. ✓

B 11/11

1. PEGASUS ELECTRONIC CANISTER TESTING AT MSFC: Through combined efforts of P&VE and ASTR, vibration tests with the Pegasus Electronic Canister (DTM electronic canister modified to flight configuration) were completed last Thursday, 11/5. The preliminary results of these tests suggest replacement of FSC isolators (50/35 Durometer) by isolators with 67 Durometer Rubber Hardness. Tests were performed to the following levels on each set of isolators.

Sweep rate 1 min/oct.

- | | |
|------------------------------|------------------------------|
| (1) 5 to 10 cps at 0.1 in da | (2) 5 to 14 cps at .16 in da |
| 10 to 40 cps at .5g | 14 to 40 cps at 1.6g |
| 40 to 115 cps at .006 in da | 40 to 111 cps at 0.9 in da |
| 115 to 500 cps at 4g | 111 to 500 cps at 12g |

36 channels of accelerometer data were obtained. Natural frequencies measured: 70-80-90 cps in different directions. Amplification measured:

- (a) at lower frequencies 1.2 to 1.3
- (b) at 70 - 80 cps 2.5 to 3.5

The isolators of 67 Durometer Hardness have been installed into the DTM (flight center structure, DTM wings, flight electronic canister with dummy black boxes). DTM vibration tests are scheduled to begin 11/9/64, 7:00 a.m. at G.E. Valley Forge facility. ✓

2. SATURN V DISPLAY SYSTEMS-AWARD OF CONTRACT: Contract negotiations have been completed with Sanders Associates, Inc. for the design, fabrication, and delivery of seven Saturn V display systems. The fixed price incentive fee (FPIF) contract was negotiated with cost the basis for incentive. The target cost of \$6,744,896.00 and a target profit of \$674,490.00 was established. The contractor has agreed to commence work immediately, although a final authorized contract is not expected until mid-December 1964. ✓

3. ST-124M SYSTEMS-AWARD OF CONTRACT: The cost-plus-incentive-fee contract for 26 ST-124M stabilized platform systems was approved by NASA Headquarters on 10/26/64. The effective date for the contract is 10/2/64 and the contract amount is \$39.3M. Here are some interesting milestones on this procurement request (PR).

- a. The PR released to Saturn Systems Office on 10/9/63, was formally placed in procurement channels on 10/24/63. ✓
- b. Request for proposal (RFP) released to Bendix on 3/20/64. ✓
- c. ASTR comments given to I.O. on 7/13/64. ✓

Even with the procurement cycle time, our development schedule was not seriously hampered, since we had the prototype units under the early R&D contract. ✓

4. ELECTRICAL MANUFACTURING COORDINATION MEETING: A meeting was held at MSFC on 11/5 and 6, jointly sponsored by ASTR and ME Laboratories. The purpose of the meeting was to review and to discuss up-dated information on a variety of subjects of direct and mutual interest to principal contractors of MSFC. Key manufacturing personnel of the following companies were in attendance: Grumman, DAC, NAA (Autonetics, S&ID, Apollo Segments), Boeing/Michoud and Huntsville, Chrysler/Michoud, IBM/Huntsville, Lockheed/Sunnyvale. Reliability and Quality Assurance Division and Program Division of MSC were also represented. Subjects included the following topics as they relate to electrical manufacturing: plastics, polyurethane coating, flow and spin soldering, welding, p.c. board plating, and flat conductor cables. ✓

B 11/4

NOTES 11/9/64 HEIMBURG

1. S-IVB BATTLESHIP, SACTO: After three attempts to get into the first firing (10 seconds), premature cutoff from gas generator over temperature (GGOT) and observer signal occurred on Saturday night 11/7/64. Preliminary examination showed one spark plug blown out of the gas generator. The data from this test must be analyzed and the engine hardware must be inspected before the next test can be scheduled. ✓
2. S-II BATTLESHIP, SANTA SUSANA: Appreciable difficulties with the lox facility fill, drain and pressurization systems were encountered during this past week. Both lox and LH₂ systems had been subjected to LN₂ tests prior to lox loading leak check and draining tests; however, complete systems had not been exposed per mutual agreement. Difficulties have been encountered in the instrumentation systems primarily those on-board systems which are similar to flight systems. These problems have been both human and equipment. R-ASTR is on top of this. ✓
3. F-1 ENGINE: The next F-1 engine firing will be 11/19/64. ✓
4. F-1 HEAT EXCHANGER TEST PROGRAM: On 11/4/64 a sixty-second duration checkout test was conducted on the F-1 heat exchanger, Test Position 114B, to verify the design integrity of the new water injector (turbine simulator). The previous test conducted on 9/3/64 had resulted in a structural failure of the water injector allowing a piece of metal to rupture one of the heat exchanger lox coils. The checkout tests are being conducted using the damaged heat exchanger as a dummy to simulate pressure drops. ✓

One more checkout test is scheduled after which an operational heat exchanger will be installed before continuing the test program.

5. LC 39 LUT HOLDDOWN ARM: The first LC 39 LUT Holddown Arm was received at Test Lab on November 2 and the arm is presently located in Bldg. 4656 (SAT V GSE Test Facility Assembly Bldg.) ✓

Before the arm can be load tested, the tie-down bolts must be torqued to 10,000 ft. lbs. This requires a special wrench which was to be supplied by KSC-D. The wrench has not been delivered as yet and load testing will be delayed until such time that the equipment is available. ✓

6. TEST FACILITIES - WEST AREA: The F-1 engine test stand was accepted from the Corps of Engineers on 11/4. Activation is in progress. First firing is scheduled for late January or early February 1965. ✓

ATTACHMENT 1: Note to Dr. von Braun & Mr. Weidner only (with NOTES 11/2/64 as an enclosure).

B 11/11

1. COMPUTER TIME: The Computation Laboratory, in answer to a letter from Dr. Mueller, is planning a presentation explaining what we consider the best method of budgeting computer time used at MSFC. The general trend of this budget procedure is that of taking complete machine availability and allocating it to divisions and/or offices of Marshall in the proportion of their present use. ✓
2. CHECKOUT OF NEW ANALOG COMPUTERS: Preliminary acceptance test on three Electronic Associates 231R-V computers was performed at the Electronic Associates plant in Long Branch, New Jersey during the past week. Two of these computers will be installed at Slidell; the other is intended for decentralized installation at the HIC Building to support Astrionics Laboratory. Mr. Sutton and Mr. Ambrose of the Simulation Branch were on TDY to perform the test on the HIC Building computer and to assist personnel from Slidell in testing the other two computers. ✓
3. ROCKETDYNE SIMULATION FACILITY: The Simulation Branch is continuing to support the Engine Project Office in determining the requirements for simulation facilities at Rocketdyne. During the past week, Mr. Lawrence and Mr. Spear were on TDY to the Rocketdyne plant to participate in the evaluation of bids on the analog computers being ordered for the Rocketdyne Simulation Facility. ✓
4. NASA INTER-CENTER COMPUTER COMMITTEE: Representatives of the Computation Laboratory participated in a NASA Inter-Center Computer Meeting in Washington, D.C., this week. A current task of the Committee is to investigate possible economies of Centers pooling their computer purchases for more favorable prices from the manufacturers. ✓
5. MSFC DATA CENTER:
 - a. In co-operation with Launch Support Equipment Engineering Divisions, preparations are being made to input to the Computation Laboratory's Data Center the engineering data describing the service arms of the Apollo umbilical towers and their associated crawler hydraulic mechanisms. ✓
 - b. The Data Center will produce, on request, parts lists and drawing trees. It will provide management information to aid in change control and engineering evaluation of these vital ground support equipment items. ✓

B 11/11

NOTES 11/9/64 JAMES

S-I-9 SHIPMENT: Instrumentation aboard the barge indicated the stage experienced a roll of 40.1° during a period of high seas near Miami, Florida. Indications are that the "g" force redline value was exceeded on at least two accelerometers. However, it has been decided that no detrimental effects resulted. ✓

SA-9: Draft copies of SA-9 Flight Test Directive were distributed on November 4 within MSFC for review. ✓

PEGASUS DETECTOR PANELS: A total of 188 panels of the 208 required for 1st flight have been delivered to Fairchild Hiller. No 1.5 mil panels have been delivered due to a problem with the mask used to protect the copper during MTL-3 coating. The mask allows the capacitor to "blister" away from the foam core during thermal vacuum exposure. Schjeldahl is concentrating on a solution to this problem. Although this continues as an annoying problem, it is anticipated that a solution will be found in sufficient time to permit delivery of required 8 panels by 11/13/64 when they are required in order to meet the forecast schedule. The hyper-velocity impact test series at Rhodes and Bloxson will start today, 11/9/64. ✓

PEGASUS FUNDING: Informal information has been received from Headquarters that Dr. Bisplinghoff is apparently going to fund the Pegasus Program deficit from OART funds. We are attempting to confirm this information. ✓

S-IV-10: Meetings held last week to investigate possibility of not static firing S-IV-10 have resulted in a decision to proceed with the static firing due to the many malfunctions which have occurred with cryogenic operations. The cryogenic weighing operation will be deleted and post static checkout will be shortened. ✓

S-IB SPIDER BEAM: A design review on the S-IB spider beam fix will be held this week. The proposed fix is in the form of a modification kit and can be installed with other stage operations in progress. No detrimental schedule impact is anticipated. ✓

S-IVB BATTLESHIP: S-IVB Battleship firing was initiated Saturday, 11/7/64, with cutoff occurring at approximately 120 psia chamber pressure (nominal 632-640 psia). Cutoff resulted from gas generator (GG) over temperature. The GG has been damaged and tear down, investigation, and data analysis are underway to determine the cause of malfunction. ✓

1. NASA FIVE-YEAR PLAN: In case you are wondering about my reaction to the new long range plan, here it is:

The new NASA five-year plan is better and more realistic than anything we have ever had! However, from where I am sitting, I see the following shortcomings:

- a. It does not appear to be the type of plan the President requested;
- b. It does not appear to be a plan which will insure that we will be ahead of the Russians one of these days;
- c. The plan does not offer a real challenge to NASA, and particularly MSFC, once the Apollo mission has been accomplished;
- d. The plan does not have the elements which it takes (in my mind) to compete successfully for its share of the Federal budget. I believe this kind of a plan does not offer enough "return on the investment," to sustain a 5.5 to 6.0 billion dollar budget a year for the future;
- e. This plan, if not accompanied by program definition studies for the time period beyond 1971, neglects the fact that leadtimes of complex spacecraft and launch vehicles are longer than 5 years (in fact 5 to 10) and we will end up in the same box we are today, with too few attractive missions and suitable payloads to fly in 1972 and beyond. To reinitiate such studies two years from now is too late to catch the budget decline around 1970, as presently projected.
- f. In a few years from now, I can see difficulties for MSFC to obtain a project assignment which is in line with our talents, facilities and strength.
- g. The taxpayer might view this plan (if at all) as one which offers "just more of the same;" I would expect some difficulties in keeping the public really interested in and behind the space flight program, a trend which eventually will reduce available resources.
- h. I am disappointed in how plans of this importance are developed "over night" with somebody pushing the panic button. They always result in plenty of confusion, as well as waste of money and manpower. NASA could do its job a lot better and save a lot of money!

For all of these reasons, I prefer to identify the new five-year NASA plan as "a plan to depart from" and would like to see us constantly improving it and do this with vigor!

(When I joined your team almost 10 years ago, you told me that you did not expect me to be a "yes man;" I am still adhering to your advice as you can see.)

2. POODLE: In last week's NOTES you asked the question, whether we see any use of the POODLE nuclear engine concept in our manned planetary mission studies. The answer is no! We have not found a suitable place for it because of its size and thrust limitations. It is more suitable for unmanned spacecraft of the Centaur and Saturn IB class, possibly later Saturn V.

1. Electrical Manufacturing Coordination Meeting: Our Upper Stage Manufacturing Support Office (Mr. Maurer) had arranged this meeting last week here at MSFC, under the chairmanship of Mr. Angele, R-ASTR; Co-chairman was Mr. K. Boucher, Deputy Manufacturing Manager of DAC. There exists great interest in industry for exchange of experience in electronic manufacturing and development of new techniques since every company is using slightly different processes, equipment, and techniques, with varying success in achieving the high quality workmanship required. Participants in the meeting were from DAC, NAA (L.A., Autonetics, S&ID Saturn, S&ID Apollo Divisions), Grumman, Boeing, Chrysler, IBM, Lockheed, and NASA-MSC. The high quality of presentations by R-Astrionics and DAC revealed a wealth of know-how not obtainable from any other source. As one example, I would like to mention the development of a new, much improved, flow soldering machine by DAC, carried out with company funding. A few years ago such a development would have been regarded as a real proprietary item for the benefit of the company only. This change of attitude is an indication that in the Apollo Program we are succeeding in forming teams in the area of manufacturing between NASA and the stage contractors.

2. S-IC Bulkhead Welding: The two major problem areas in bulkhead welding are the meridian welding of the gores and the Y-ring welding to the bulkhead. The meridian welding was successfully solved at Marshall, while Boeing's approach yielded a high rejection and repair rate. The adjustment of the Michoud Operation to the experience here is going on at the present time. On the other hand, the Y-ring to bulkhead welding was constantly troubling our operation here, while at Michoud not being critical. The adjustment of our processes here to the Boeing experience yielded last week a full success of the Y-ring to bulkhead weld on the upper fuel bulkhead for 501. This is to our knowledge the first circumferential weld with no repair requirement. ✓

3. Manufacturing Milestones for S-IC: The structural assembly of the Intertank Section, LOX Container, and Skirt for -T has been completed in the tower. This unit has been moved to 4705, and horizontal installation of sub-systems is starting. The Fuel Container halves for -S have been moved into the tower, and final close-out weld has been accomplished over the weekend. ✓

4. New Manufacturing Problem for S-IC Thrust Structures: All NAS1022A self-locking nuts, 1/2" to 1", made via forging process have failed 100% on laboratory failure analysis tests. These nuts are used extensively throughout the Thrust Structure assemblies, and -D, and -I, and -S assemblies at Michoud will require major rework to replace defective nuts. The -T Structure is being analyzed to determine its status. Discovery of these faulty nuts was made at Michoud wherein many of those installed and torqued to specified 1300-1500 in./pounds fractured to the extent that they could be removed by hand and had large visual cracks. ✓

NOTES 11-9-64 MAUS

B 11/1

1. NASA-DOD INTERFACES - The NASA Policy Planning Board has requested through Manned Space Flight, information concerning existing machinery for coordination between NASA and DOD. We are forwarding today a listing with brief explanation, of the interfaces existing between MSFC and the various military field installations. ✓
2. IMPORTANT VISITS:
Mr. Earl Hilburn - A letter announcing the visit on November 16, and the planned program has been forwarded to Mr. Hilburn for his comment. The dry run for this visit is scheduled for 8:30-10:45 A.M., November 10. ✓

Gen. William McKee, Assistant to Mr. Webb for Administration, will visit MSFC at Huntsville, Michoud and MTO, November 30, December 1 and 2. Detailed plans are being prepared. ✓
3. AIR FORCE PROJECT FORECAST REPORTS - Nine volumes of Air Force Project Forecast Reports (classified Secret) have been received from E. Z. Gray for review. Comments are due in MSF November 30. The reports are being furnished to Director, R&DO, for review by appropriate technical personnel. ✓
4. COST AND SCHEDULE TREND ANALYSIS - The major portion of our time and effort are being spent on preparations for your meeting with Mr. Webb on November 24, 1964. MSFC has been allocated two hours on the agenda, to respond to:
 - Mr. Webb's October 20 memo to Dr. Seamans, and
 - Recommendations contained in Mr. Hilburn's preliminary report to Dr. Seamans on Studies Relating to Management Effectiveness in Scheduling and Cost Estimating.Dry run for this exercise is scheduled for 8:30-10:45, November 13, 1964. ✓
5. CIVILIAN PERSONNEL STAFFING FOR FY66 BUDGET - Mr. Hilburn is not satisfied with the info received to date in support of civilian personnel requests for the NASA FY66 budget, and has called a meeting of representatives of the various centers for 1:00 P.M. today, November. 9, to begin a review in depth of the basis for the requirements expressed. We were notified of this meeting at 3:00 P.M. Friday, along with a request for an enormous amount of detailed statistics and information, which of course could not be compiled in the time available. Don Messer and Bill Rutledge of Executive Staff and Louis Snyder of Financial Management are enroute to Washington to attend the meeting. ✓

1. DISTRIBUTION OF MANPOWER WITHIN LABORATORIES: A special survey was conducted by Resources Management Office in response to concern expressed by IO regarding distribution of the Civil Service manpower being reported by the laboratories in support of the Apollo Program. The survey was to verify validity of the manpower distribution as reported on daily time cards and to assess the percentage of effort being applied to each major project. (The survey was conducted on sampling basis by pre-selection of individual time reports in each laboratory. Examination of the actual tasks performed established the basis for the validity of the work reported.) Results of the survey indicated that reporting procedures were reasonably accurate and that the labor distribution properly matched our presently assigned in-house effort on the major projects. Further analysis appears in order to balance properly the effort between Saturn I, IB, and V. Shown below is the percent of distribution of labor, by categories indicated, for the first quarter of FY 65.

| MONTH | Saturn | | V | Non-Sat | Indirect | *Non-Work | Total(%) |
|--------|--------|-----|------|---------|----------|-----------|----------|
| | I | IB | | | | | |
| Jul 64 | 18.0 | 6.0 | 34.7 | 12.9 | 13.3 | 15.1 | 100.0 |
| Aug 64 | 18.3 | 6.6 | 35.9 | 12.9 | 13.9 | 12.4 | 100.0 |
| Sep 64 | 17.7 | 6.4 | 36.3 | 13.0 | 13.0 | 12.9 | 100.0 |

* Non-work is that time charged to annual and sick leave, holidays, and other absenteeism.

McC

Request a more detailed breakdown in next NOTES

2. TRANSFER OF PERSONNEL SPACES FROM R&D OPERATIONS TO INDUSTRIAL OPERATIONS: R&D Operations agreed to transfer 250 Civil Service spaces to Industrial during FY 64 and FY 65. This was an agreed upon plan to provide assistance to IO in their initial staff buildup. To date, 43 spaces have been transferred. It was planned to meet the remainder of the commitment (with certain exceptions) by transfer of spaces which became available from normal attrition. The average monthly rate of attrition experienced in R&D Operations over the last several months is approximately 30 spaces. However, individual personnel replacement actions by laboratories has reduced available transfers to IO below the required minimum. To offset this situation, R&D Operations will reduce recruitment ceilings approximately 50 per cent and will curtail replacement actions within the laboratories to insure meeting our commitment to IO. This approach will not preclude replacement of critical spaces lost in laboratories.

Have
Beidert
+ Jerry
McCall
Let's
discuss
this.
PRESTO.
PROMPTO
B

(I think we should seriously move more people 'body and space' to I.O. to help the I.O. buildup. And I think we can afford it without crippling R&D Ops B)

B // //

NOTES 11/9/64 RUDOLPH

1. A Revised Saturn V Program Development Plan (PDP) was forwarded to General Phillips last week for his review and approval. Copies were also distributed throughout MSFC for internal use only pending General Phillips' approval. ✓

2. Bulkhead Fabrication for S-IC at Michoud - (Reference Notes 11/2/64 Kuers) In general, we concur with Mr. Kuers' notes of November 2, 1964. MSFC has freely furnished to The Boeing Company advice, technical assistance, and the benefit of experience whenever requested. However, The Boeing Company has been very reluctant at times to accept and implement suggestions by the Government. *77k Let's discuss this with Lyale Wood when he visits here*

3. S-II Stage:

Battleship Testing - As of 9:00 am, CST, today, the S-II Battleship firing is in final countdown, in process of preparing to tank LOX, with the plan to have ignition by 2:00 pm, today, CST. ✓

Common Bulkhead Forward Facing Sheet for Common Bulkhead Test Tank - Hydrostatic testing to certify the repairs made in this bulkhead has been successfully accomplished. ✓

Manpower Evaluation - The manpower evaluation survey is continuing at S&ID. It appears that a significant savings will not result from the survey. The S&ID manpower estimates exceed our present programmed funding; therefore, program adjustments have been authorized and are summarized as follows:

a. No expense should be incurred during the remainder of FY 65 to design, fabricate or purchase more than three sets of GSE (over and above the set for EMM). These sets are allocated as follows: One to Santa Susana, one to Station 8 at Seal Beach, and one to Test Stand A-2 and Control Room at MTO. ✓

b. Station 4 at Seal Beach will not be equipped with checkout equipment. S-II-F and S-II-D checkout will be in Station 7. ✓

c. Checkout of S-II-T originally scheduled for Station 4 at Seal Beach will be performed at Santa Susana on the test stand. ✓

d. Station 8 at Seal Beach will be made operational in time to accept S-II-1 per the present schedule. ✓

S-II Split Aft LOX Bulkhead (S-II-S) - No significant conclusions are presently available regarding the cause of the aft LOX bulkhead failure. An analysis is presently being made of the material and weld quality in the area of a manhole cover which is the suspected starting point of failure. The consensus of opinion is that it is not a bulkhead design problem but the trouble is likely to be in the area of manufacturing processes - probably welding. A Recovery Schedule is being initiated. ✓

Attachment: Notes 11/2/64 Kuers (Dr. von Braun and Mr. Weidner's copy only)

NOTES-11-9-64-SHEPHERD

B 11/11

Col. Gould's Visit to the West Coast: Col. H. A. Gould, Technical Staff Consultant to the House Space Committee, visited Downey and Seal Beach on November 2, Edwards Air Force Base on November 4, and Sacramento on November 5 in conjunction with visits with other NASA sites during the same week. He was accompanied by Lt. Col. Barnett, Industrial Operations, and Mr. Harry Mitchell, MSF, during his visit of sites of Marshall responsibility.

He had no disparaging comments about the work that had been done or the method of its accomplishment at the Marshall sites. He implied that if other Marshall activities followed the same pattern that he did not expect any difficulties during the FY-66 Budgeting hearings for Construction of Facilities. ✓

Col. Gould is expected in Huntsville on November 18 and 19, Michoud, Slidell and MTF on December 19 and 20. ✓

Vehicle Components Supply Building at Michoud: Award of this construction to the low bidder was delayed as a result of a protest from the second low bidder. Senator Long, Louisiana, requested the Small Business Administration to have the award of the contract withheld until the second bidder could appeal to the Comptroller General, however, Small Business Administration ruled in favor of the low bidder and notified Headquarters of their decision. Headquarters has given us authority to award the contract. Formal award of the contract is scheduled for the early part of next week. ✓

B 11/11

NOTES 11-9-64 Stuhlinger

1. SRT PROGRAM STATUS: The status of the FY-65 ART/SRT Program under the cognizance of RPL is, as of November 6, 1964, as follows:

| | <u>ANNUAL PLAN</u> | <u>AUTHORIZED</u> | <u>PROCESSED TO FMO</u> | <u>OBLIGATED</u> |
|------|--------------------|-------------------|-------------------------|------------------|
| OART | 9,769,000 | 6,650,000 | 3,075,000 | 1,861,396 |
| OMSF | 8,965,000 | 8,965,000 | 422,406 | 0 |
| OSSA | 475,000 | 475,000 | 0 | 0 |
| | <u>19,209,000</u> | <u>16,090,000</u> | <u>3,497,406</u> | <u>1,861,396</u> |

2. PHYSICS SYMPOSIUM LECTURE: On November 4 Dr. Shelton gave a lecture on advanced propulsion at the University of Chattanooga annual symposium on "Frontiers of Applied Physics." Other speakers included Dr. Weinberg of ORNL and Dr. Goethert of AEDC, Tullahoma. ✓

3. MSFC CRYOGENIC LIQUID PROGRAM: At Dr. Bisplinghoff's request we forwarded to him on November 2 a report entitled "Evaluation of the MSFC Program for Prolonged Storage and Use of Cryogenic Liquids." ✓

4. CONSOLIDATED SUPPORTING RESEARCH OFFICE: At the last R&D Council Meeting and following thorough discussion, the Council generally approved the plan to consolidate the management of research. Final R&DO decision to proceed will be made when certain procedural matters are established, probably within two weeks. ✓

5. BIDS FOR RPL SERVICE CONTRACT: Response to the RFP for the RPL service contract was quite strong (17 bids), and includes a number of excellent proposals. ✓

NOVEMBER 16, 1964

NOTES 11-16-64 BELEW

fw 11/16

B 11/18

*fw F-1 ENGINE

During this report period, engine F-2005 completed acceptance firings at NASA RETS, Edwards Air Force Base and has been moved to Rocketdyne, Canoga Park for final checkout.

Engine F-2006 began acceptance firings on Test Stand 1D with a satisfactory 150 second run on November 6, 1964. This engine is scheduled for FRT calibration tests.

Engine 2004 has been installed in Test Stand 1A preparatory to start of FRT limit series on November 16, 1964. ✓

RL10 ENGINE

The NASA Cost Reduction Evaluation Team, headed by Scott Fellows, surveyed Pratt & Whitney last week and was impressed by the strength of cost control vested in the Program Manager. The team said that P&W has one of the strongest program-oriented cost control system of any of the five contractors visited to date. (P&W, IBM, Chrysler, Mason Rust & GE) ✓

P&WA is bidding on the first phase thrust chamber work for the Phoebus Nuclear Project. The chamber is about the size of that for the Hi Pc engine under study by P&W. Other bidders are Aerojet, Bell, and Rocketdyne. The project is managed by SNPO. ✓

X-raying of the bulkhead to check the effect of a LOX tank over pressurization (indicated bulkhead satisfactory for flight) resulted in about a 3-week delay in the launch of AC-4, the first two-burn Centaur mission. ✓

*fw J-2 ENGINE

The initial J-2 engine firing on the S-IVB Battleship program resulted in a gas generator ignition delay and subsequent over temperature condition. The gas generator and hydrogen pump turbine were damaged and are being replaced. Temporary measures are being taken to prevent recurrence of this so Battleship testing can continue. Testing at Battleship propellant chill conditions will be made at Rocketdyne in order to solve the problem. A flight configuration engine is being expedited for use in the S-IVB Battleship program. ✓

The S-II Battleship had a successful single engine firing on November 8. ✓

NOTES 11-16-64 CLINE

B 11/19

fw 11/16

1. CONTRACTOR SPECIFICATION REVIEW: Twenty-four North American Aviation (NAA) specifications were received for review on an emergency basis because of NAA production line stoppages. All are electrical specifications and have been reproduced and distributed. Review commitments were obtained from the various interested laboratories, and review conferences have been scheduled for the week beginning 11-16-64. ✓

2. SATURN IB: The SA-201 Vehicle/Launch Complex Composite Mechanical Schematic prepared by Chrysler-Michoud Operations was reviewed. It was found to contain so many errors and of such a large magnitude that action has been initiated to have the contractor void the drawing and notify all recipients accordingly. We will work with the contractor to straighten out whatever problems exist so that an accurate release may be made.

*fw 3. SA-7 MOVIE CAMERA CAPSULE RECOVERY: Hurricane Gladys cancelled all recovery action on the eight movie camera capsules ejected during the SA-7 flight on 9-18-64. Since then, three of the eight capsules have been washed ashore in the Bahama Islands and recovered. Two of these capsules drifted ashore on the island of Eleuthera, approximately 290 miles from point of impact. Motorcycle teams are searching the beaches of these islands for any of the other capsules that may have washed ashore. Two of the capsules were brought back to Cape Kennedy. The latest information on these two are that they were in good condition, and the film was dry when removed from the camera. The capsules were discovered on 11-9-64. ✓

4. SATURN IB/MINUTEMAN: On 11-10-64 a meeting of the Saturn IB/Minuteman Technical Review Panel was held to discuss the comments received on the preliminary statement of work from the panel members and Chrysler Corporation (CCSD). At this time a revised work statement was distributed and a meeting with CCSD representatives was announced for 11-13-64 to discuss unresolved areas of the work statement. Official liaison has been established with the Manned Spacecraft Center (MSC); MSC contact man is Mr. Paul Thomas. Arrangements have been made for representatives of the Technical Review Panel to brief MSC personnel in Houston on 11-23-64. ✓

5. NUCLEAR PULSE (ORION): Current efforts within NASA Headquarters relative to ORION are being directed to respond (negative or affirmative) to DOD requests (relative to NASA interest in ORION) by 11-16-64. This date appears to be the last time by which the pending USAF reclama will be considered. ✓

The General Atomic ORION staff is presently being shifted to company funding until 1-1-65. Beyond this date, the status is not currently known. As of this date, USAF funding will not carry the project beyond January 1965. ✓

There is strong NASA Headquarters interest in ORION on the part of Dr. Eggers, formerly of Ames Research Center (ARC) and currently reporting to Dr. Bisplinghoff. From all indications, it appears that if attempts at NASA Headquarters are successful in reinstituting the program, and NASA interest is forthcoming, ARC will be responsible for the major technology work within NASA. If this is not considered desirable, efforts should be initiated to avoid the potential shift of responsibility.

F.C.
Suggest
you
notify
Doug
Lortey

about this!
He seems
convinced
that
anything
C.E.
does is
perfect
B

F.C.

Is this
want to
be a
bid for
the job by
you. B

B 11/19

fw 11/16

1. SI-IB

Routine operations continue on all vehicles. S-I-10 received at MICH following static testing. ✓

2. S-IC

Y-Ring Cracking - A crack visible to the naked eye was discovered on the Y-Ring for the "D" Lower LOX Bulkhead about November 6. Boeing has since surveyed all of the eight rings available at Michoud and has recommended a test program to determine the severity of the findings. MSFC does not desire to accomplish any testing of Y-Rings, at least until we have had an opportunity to meet with Boeing to discuss theories. As it stands today, the observed cracks (primarily with 40 and 100 power scopes) appear to result from differential etching which have caused grain boundary failures by removing Cu Al₂ concentrates precipitated at the boundary during welding and ensuing cooling. By removing this compound, which is more soluble in the etchant, we have what appears to be a local surface cracking. There is no apparent degradation of material properties. The problem does not appear serious but obviously an improvement in Y-Ring welding and cleaning techniques is desirable. ✓

Design Differences Between MSFC and Boeing - A special meeting was called by this office in an attempt to resolve the design differences between MSFC and The Boeing Company. The meeting was staffed by R-ASTR, R-P&VE, R-ME, IO, R-QUAL, and R-TEST, as well as most of the responsible elements of The Boeing Company. As an outcome of this meeting MSFC has decided to install only those elements absolutely necessary for internal viewing of LOX tank aboard the "T" Vehicle, i. e., all electronic gear will be installed on test stand and camera ejection system deleted. The Boeing Company was not in complete agreement since they would like to see the "T" Vehicle used as a "Test-Bed" for qualification testing of the complete camera system. However, the consequence of a schedule slide which would result from the incorporation of this extraneous gear on the "T" Vehicle makes it impractical to consider its installation.

Karl
Heimbach
Sounds
different
from what
was said
in the
meeting
with
Boeing
today
B 11/19

NOTES 11-16-64 DANNENBERG

B 11/19

fw 11/16

1. Saturn IB/Titan IIC Comparison - Headquarters has requested MSFC assistance to prepare the reports to the AACB. Primary problem is to integrate the technical and cost studies. Areas such as: inadequacy of the Titan III guidance system to perform all proposed Titan III missions, limited Titan III payload diameter and volume capability, and incompatibility of costing ground rules which favor the Titan III Program will be pressed by Dr. B. Shratter (R-SA). ✓

2. Data Submittal Requirements Directive (CM-005-0001) - IO and R&D Operations agreed in a meeting on 11-13-64 that a detailed weight and performance data submittal for every Saturn IB and V vehicle would be undesirable because the requirement for additional manpower to generate similar data for each vehicle could not be justified. However, data for SA-206 and SA-506 will be submitted in accordance with CM-005-0001 and all other vehicles will be reported in a summary format similar to the present data submittals. ✓

3. S-II Design Reviews - A preliminary (in-house) design review meeting of the thermal control system was held. A surprisingly large number of consideration items were presented by R&D Operations personnel. A fundamental question concerning authority for design approval by a single Lab was raised by R&VE. The official design review with S&ID has been postponed until this item is resolved. R-SA is addressing itself to this question and expects to come up with an early solution.

KJ.

Please elaborate.
What exactly
is the issue?

I'd be interested
in studying this case
as representative for
many similar problems,
so please furnish me
with some detail
material B

fw 4/16

B 11/19

NOTES 11-16-64 FORTUNE

1. Meeting with United Gas Pipe Line Company Officials Monday - was cordial, but not contract-productive! They gave us a letter promising gas under the appropriate tariff, said they would provide service agreement, but plainly stated they did not wish to sign certain clauses normally incorporated in government contracts. United Gas reported they had no formal contract with any government (or other) installation in the South. I have forwarded correspondence to IO Contracts Office. Immediate annual cost is not high enough to justify carrying this on to NASA Headquarters for negotiation. ✓
2. GAO Exit Conference Tuesday - indicated their visit was premature, would not be considered a formal audit, nor would other than internal report be made upon it. We invited them back to make a helpful review of ours and support contractor's practices when appropriate. ✓
3. CAB Visit Thursday. Messrs. William Madden, CAB Hearing Examiner; V. Rock Grundman, Bureau of Economics Council; Leonard Johnson, Bureau of Economics Witness; Carl F. Paul, Jr., Counsel, NASA Headquarters; J. W. Herring, Deputy Chief, Technical Services Office, MSFC; Graden Hall, Vice President of Sales, Southern Airways, Atlanta, Georgia; J. O. Lasseter, District Sales Manager, Southern Airways, New Orleans, La.; Cling, Member, Huntsville-Madison County Airport Authority; and Matthews, Attorney, Huntsville-Madison County Airport Authority, were driven over from Slidell at 1:30 p.m. They were given briefing on construction, funding, manpower build-up, proposed Picayune Airport, potential use of Gulfport Airport, and how utilization of Lakefront Airport instead of Moisant could save us 1 to 1-1/2 hours ground travel each way. They grew more open and friendly as the tour of building sites progressed, indicating our transportation problems would receive consideration. Nothing was mentioned of the present GE-leased airplane, although we had calls regarding it from McCollom, NASA Headquarters that same day. It was made clear to McCollum that the Cook Brothers DC-3 was leased by GE without our approval, was charged to overhead, and subject to disallowance if post-audit indicated it to be unjustified. We are about to negotiate for a different operational support aircraft service as a direct charge to the contract, for non-scheduled transport of personnel or materials when commercial air and working schedules conflict, and operational requirements or other government interests justify. Have cleared this with Harry Gorman. ✓

NOTES 11/16/64 GEISSLER

B 11/19

11/16

1. Saturn Orbital Debris: The article "Space law gets set for launching" published in Business Week, November 7, 1964, (enclosure) is brought to your attention in connection with the Saturn Orbital Debris work. A meeting will be held in Building 4200, Room 409, at 8:30 A.M. on November 19, 1964, to hear presentation by Douglas Aircraft Company (DAC) and Lockheed, Huntsville, (LMSC) on proposed Saturn IB and V retro systems, respectively. ✓ To VAB you have meeting with hyle wood

2. Remote Sites for Apollo Flight Control: Dr. Mueller has established a task force under Christensen to review the respective roles of remote sites and Mission Control Center in decision making for Apollo. Mueller questioned specifically the great computer and display requirements for each remote site. A final summary meeting of the task force with Dr. Gilruth was held at MSC on 11/13. Dr. Speer attended. The following conclusions were reached and will be reported to MSF: (1) The proposed flight operations measurement parameters for each part of the space vehicle are realistic and acceptable (this includes 130 parameters or 1.3 kb/s for the S-IVB/IU); (2) The total display requirements exceed the capability of Gemini remote site equipment; (3) Reliability of communications must be improved before decision making at remote sites could be given up; cost would be comparable with present remote site cost; (4) Remote sites will be manned with minimum required for each specific mission; (5) The utilization of Comsat for remote site communication should be strongly supported. In summary: no immediate change of the present remote site concept is to be expected. ✓

3. Cislunar Pegasus: A meeting was called on Nov. 13 by Mr. de Fries with all participating laboratories present, and the following program was established for support of the Cislunar Pegasus program:

November 13 to December 7 - Establish a project description including identification of problems and mods, concept of operation and rough cost data (50% confidence).

December 7 to February 15, 1965 - Preparation for in-house or contractor project definition study, including preparing preliminary development plan, project proposal and specifications.

February 15 to July 15 - Contractor or in-house project definition study to establish solution to all problems, a firm development schedule and cost estimates, and a proposal firm enough for fixed price or incentive contract.

July 15 to October 15 - Proposal review and selection of contractor.

October 15, 1965 to October, 1967 - Hardware development.

A teletype is being sent to Gen. Phillips today outlining this program.

E.F.

Do we handle this completely without Fairchild
to keep our hands free re contractor selection?

B

B 11/13

fw 11/16

1. S-IU-8 INSTRUMENT UNIT CHECKOUT: Mechanical pressure and functional testing of the S-IU-8 Instrument Unit has been completed. Some minor leaks have been repaired and a purge of the gas-bearing system was made to meet condensable hydrocarbon specifications. Transfer to Vehicle Systems Checkout has been delayed pending a "fix" on cables with recessed pins. Scheduled Laboratory release date of December 27, 1964 is not expected to be affected. ✓
2. S-I-9 STAGE: Pre-launch testing of the S-I-9 Stage is in progress at KSC. No damage caused by rough seas during shipment has been found. ✓
3. S-IC PROGRAM: The S-IC fuel tank completed hydrostatic testing successfully November 10, 1964, following repair of the cracks found in the tank weldments. ✓
4. FLIGHT RATING TEST (FRT) F-1 ENGINE: A representative of this Laboratory has joined the team of MSFC representatives (R-P&VE and R-TEST) at Edwards for the Flight Rating Test of the F-1 Engine. FRT scheduled to begin immediately will continue for approximately two (2) months. ✓
5. S-IVB QUALIFICATION TEST PROGRAM: Douglas has presented a new schedule for the S-IVB Qualification Test Program which represents a slippage of approximately eight (8) months from the schedule presented in the last quarterly review. The new schedule completion date for the Qualification Program is July 15, 1966.
6. ELECTROMAGNETIC COMPATIBILITY (EMC) TEST: During the Electromagnetic Compatibility (EMC) test on the S-I-8, a signal was observed, when all stage telemeter systems were operating, that was near the image frequency of the stage Command Destruct Receiver (CDR). Astrionics acknowledged awareness of this resultant frequency but felt that the strength was too low to trigger the CDR. We recommended NASA-Michoud have CCSD monitor this signal along with the CDR outputs during future tests to verify that no problem exists. ✓

D.G.

I hope it's more than a feeling!

Lee Jones

Your Comment is invited

B

NOTES 11/16/64 HAEUSSERMANN

B 11/19

fw 4/16

1. PEGASUS ELECTRONIC CANISTER TESTING AT THE GENERAL ELECTRIC VALLEY FORGE TEST FACILITY: Vibration tests for the Pegasus Electronic Canister in conjunction with the Dynamic Test Module of Pegasus at GE-Vibration Test Facilities are in process. Tests about the y axis and z axis are completed. Tests about x axis (longitudinal axis) are being prepared and should be completed on 11/18. Evaluation of test records is under way. Preliminary results will be reported in the next notes. ✓

NOTES 11/16/64 HEIMBURG

B 11/19

Tw 4/16

* fw

1. S-IV STAGE:

The S-IV-8 static test is scheduled for 11/19 at Sacramento. A plan has been developed to speed up the S-IV-10 schedule at Sacramento by eliminating the cryogenic weighing and short-cutting several pre-static and post-static checkout procedures. ✓

2. S-IVB BATTLESHIP:

As a result of the attempted 10-second test performed 11/7, which was prematurely terminated by the gas generator over-temperature device, the planned test program has been revised. The next test, presently planned for 11/20 or 11/21, will be a programmed cutoff directly after gas generator valve is fully opened. ✓

Engine J-2003 will be rebuilt per Rocketdyne recommendation to include the following replacements: gas generator, valve and injector, fuel turbo-pump, oxygen turbine bypass valve, mainstage solenoid in regulator package, miscellaneous control lines, and checkvalves in burned area. The lox turbine was inspected and no damage found. ✓

3. S-II BATTLESHIP:

The S-II battleship single J-2 engine ignition test was successfully performed on 11/9, with no major discrepancies noted. ✓

At present, a 3-second firing is proposed for 11/21, but since Douglas Aircraft Company has an S-IVB transition test planned for the same date, it has been recommended that S-II delay to get the results of the Douglas Aircraft Company test. ✓

4. MTF WORKING GROUP:

MTF Phase I Technical Systems: Apparent low bidder for installation of phase I technical systems at MTF under an Aetron subcontract is Video Corp., San Diego, California (\$1,256,000). This proposal is currently under MSFC/Aetron review. ✓

A potential difficult situation at MTF in connection with availability of qualified technical systems installation personnel (phase I) has been somewhat alleviated. Arrangements were concluded last week between Aetron, its sub-contractors, the president of the International Brotherhood of Electrical Workers (IBEW) and officials of the local IBEW at Gulfport, Mississippi, for Aetron to send locally-hired IBEW personnel to the NASA School of Reliability and Quality Assurance at MSFC. These personnel will later teach this course to other IBEW personnel for use at MTF. We have agreed to furnish training aids and materials for this purpose. ✓

NOTES 11-16-64 HOELZER

B 11/19

1. TECHNICAL MATERIALS ON-LINE PREPOST INVENTORY SYSTEM: A presentation on the On-Line Prepost Inventory System to be implemented on January 1, 1965, was given to Mr. Newby of the Director's Office, Mr. Buckner, Chief of the Purchasing Office, Mr. Foxworthy, Chief of the Technical Services Office, and Mr. Fraser, Deputy Chief of the Financial Management Office. The presentation was well received and many beneficial comments were offered by all parties. Mr. Newby recommended that the presentation be held again for Dr. Rees and Mr. Gorman. *Frank W. And me? B*

2. NASA INTER-CENTER COMPUTER COMMITTEE PARTICIPATION: A Laboratory representative was named to the NASA Sub-Committee on Administrative and Management ADP Systems and participated in a meeting in Houston last week. NASA Headquarters (Jack Young and Ed Buckley's offices) is quite concerned with the NASA image in business data processing applications with regard to the McClellan Committee Congressional hearings planned after the first of the year. The Sub-Committee on Administrative and Management ADP Systems has not been very active to this date. It now appears that a task force will be established of Center personnel in NASA Headquarters to develop common ADP business systems and to develop a NASA-wide business ADP program. We feel it is in our own best interest to participate in such an effort. ✓

3. PHASE-OVER OF THE IBM DATA CENTER EFFORT TO THE GENERAL ELECTRIC SUPPORT CONTRACTOR: The General Electric support contractor is now recruiting ADP personnel to take over the IBM Data Center contract effort. The IBM group probably will phase-out around the first of the year. This is in keeping with the single support contractor concept within each laboratory. Most of the IBM personnel will move to the IBM Instrument Unit group in the Research Park. It appears that none will join General Electric. Every effort is being made, however, for continuity of Data Center systems and progress.

4. ROCKETDYNE SIMULATION FACILITY:

The evaluation of proposals for an analog computer system to be installed at Rocketdyne was completed last week. Mr. Spear and Mr. Lawrence of the Simulation Branch participated in the evaluation at the request of the Engine Project Office. ✓

The proposal of Applied Dynamics, Inc. was selected from the six received; nine manufacturers did not submit proposals. Applied Dynamics presented the best technical proposal and also had the lowest basic system cost. Total cost of the selected system is \$694,000. ✓

1-4
this is a
matter of
the IBM
people not
wanting to
join G.E.
not much
IBM can
do about it
Hoelzer thinks
it will work
out ok

Harvey
If the
minimum
needed for
Data Center
continuity
cannot be
kept, for a
transitional
period, maybe
we should
have a
heart-to-
heart talk
with the
local IBM
management
B

fw 11/16

B 11/19

NOTES 11/16/64 JAMES

SA-7 CAMERAS: Inspection revealed that the two onboard cameras recovered last week had not leaked and the film was viewed and is in good condition. One camera was positioned looking into LOX Tank No. 3 through fiber optics and the other in the interstage of the S-IV looking at the RL-10 engines. ✓

PEGASUS ELECTRONIC CANISTER: Vibration tests of the dynamic test model canister have been completed at P&VE. The analysis of the data has not been completed but apparently no major difficulty was encountered and all inputs were below the critical level of the canister and electronic boxes. The test series at GE has begun and vibration in the "Y" axis has been completed. The data obtained is being reduced and should be available early this week. "X" axis testing should begin as scheduled on 11/21/64 and all data reduction completed by 11/25/64. ✓

PEGASUS DETECTOR PANELS: Schjeldahl has successfully tested a .0015" panel and it now appears that they have solved the manufacturing problem. All panels for Pegasus A should be delivered in sufficient time to meet the required spacecraft delivery date. ✓

~~S-IV-8:~~ S-IV-8: Acceptance firing of S-IV-8 is scheduled for November 19. ✓

*fw S-IVB DYNAMICS TEST STAGE: Due to the "oil canning" of the forward LH₂ bulkhead, an additional proof pressure test was required to insure stage structural integrity. The test was conducted on Nov. 8, pressurizing the LH₂ tank to 13.1 psi, establishing the acceptability of stage design. Present status indicates that dynamics stage will be shipped to MSFC on Dec. 3 with arrival about Christmas. ✓

S-IVB BATTLESHIP: Battleship start failure causes are not yet completely defined but solution is believed to be in: (1) gas generator modifications which are presently available but were not in 2003 Engine; (2) helium purges or temperature conditioning of gas generator to prevent severe undercooling. Decisions were made to repair and modify present 2003 Engine and run a shorter duration (1 second) test to prove out the proposed modification. It was concluded that ground test engines such as presently installed were "dead end" items and that a flight configuration engine must be obtained as soon as possible due to significant differences in the gas generator area. Engine 2013, presently scheduled for S-II battleship, will be diverted for S-IVB for December delivery. In the interim, the present modified engine will be used to prove the facility and explore other problems. A team has been appointed to define the necessary modification to Engine 2003 and also the test criteria for the next 1 second test. They will also develop backup plans for a possible second failure. If the 1 second test is successful, the program will proceed as presently planned. Tentative schedule for next firing would not be earlier than Nov. 20 or Nov. 21, but will be paced by final data analysis and team conclusions. ✓

B 11/19

NUCLEAR SYSTEM COMPARISON: During Dr. Mueller's last visit here (October 22, 1964), he requested that we prepare a staff paper with preliminary answers to the following two questions:

- a. What research and development tasks have to be undertaken for each of the applicant systems to demonstrate its technical feasibility?
- b. How do these systems compare, performance and costwise, if put on a common basis?

We have set the machinery in motion to prepare this staff paper and have formed an ad hoc working group with FPO, P&VE (Jordan), RP (Dr. Shelton), and Aero (Thomae) participating. A plan of attack has been agreed upon, which is as follows:

a. Nominal mission comparison is done for a 1984 Mars launch window with a 500-day trip-time including a minimum of 20 days stopover. The crew size will be a minimum of eight, and the landing vehicle will weigh 80,000 lb. ✓

b. We will use 10 different modes to compare various combinations of types of propulsion systems. Some of the lower performance vehicles will use the Venus swingby mission profile, the higher performance systems will not. ✓ The Earth reentry speed in all cases will be below 50,000 ft/sec. ✓ There will be two cases where the spacecraft returns into an Earth capture orbit instead of direct atmospheric entry.

c. Each of these 10 cases will be investigated assuming

(1) Saturn V only and ✓

(2) Post-Saturn and Saturn V as launch vehicles. ✓

d. The following parameters will be derived for comparison purposes:

(1) Total mass per ship leaving Earth orbit. ✓

(2) Dry mass per ship leaving Earth orbit. ✓

(3) Total departure mass in Earth orbit divided by useful payload carried to Mars orbit. ✓

(4) Total departure mass in Earth orbit divided by spacecraft mass returning to Earth. ✓

(5) Total departure mass in Earth orbit divided by man-days available on Mars surface. ✓

(6) Total project cost divided by man-days available on Mars surface. ✓

(7) Direct operating cost (excluding R&D) divided by man-days available on Mars surface. ✓

HHK

How about
"Total number
of earth-to-
orbit logistic
supply flights?"
Considering the losses
incurred by orbital
operations
- effect of cryogenics vs
"dry" Orion propulsion
- effect of Post-Saturn vs
Sat. V
B

fw 1/6

B 11/19

NOTES 11-16-64 KUERS

Tank Configuration Development Program: This is a joint program of P&VE Laboratory and Manufacturing Engineering Laboratory. The purpose of this program is twofold: (1) development and study of new tank design concepts including load tests of model tanks for verification of stress calculations and (2) development of new manufacturing techniques and tooling concepts. The first tank built for this program was the 200 inch diameter multicell container which is presently entering the test phase at P&VE's Experimental Structures Branch. We have now started the assembly of the second container of this series which is a toroidal tank, 200 inch diameter. Besides using a new high strength aluminum alloy of the 7000 series (Al-Mg-Zn), the following new manufacturing techniques will be applied:

- a. Hot drape forming.
- b. Local flaring of outlets, mechanically and with magnetic field application.
- c. Flash welding of the torus Y-ring.
- d. Electro-optical controlled welding skate.
- e. Structural bonding of slosh baffles.
- f. High energy forming of complicated sump components.
- g. Super insulation and heat barrier tank support structure.

Knowledge gained in this experimental work will later support the engineering and manufacturing of Saturn V improvements and new starts. ✓

NOTES 11/16/64 MAUS

1. PERT ASSESSMENT - In my 10/12/64 Notes, I reported to you that we were planning to initiate an assessment of the major PERT applications of MSFC. This is a joint effort with Industrial Operations. First in-plant audit begins today at S&ID, NAA. ✓
2. RESTRICTIONS ON AVERAGE SALARIES AND AVERAGE GS GRADES - On Friday, November 13 (no direct significance to the date; this was inevitable anyway) we received a teletype from Dr. Mueller placing restrictions on the MSFC average salary, average grade level, and the number of persons in each of grades GS-14, GS-15, and GS-16. Ceilings were established at the levels contained in the FY65 budget as presented to Congress. The following compares ceilings, with MSFC actual as of October 31, 1964: Really!

| | <u>Ceiling</u> | <u>Actual</u> |
|----------------|----------------|---------------|
| GS-16 | 4 | 30 |
| GS-15 | 392 | 334 |
| GS-14 | 709 | 661 |
| Average grade | 10.36 | 10.03 |
| Average salary | \$9.950 | \$10,131 |

The headquarters action was prompted by Bureau of Budget concern over the increase in average grade and salary in NASA. Mr. Gorman has a statement of impact and details of the situation, and plans to discuss the matter in Washington this week.

3. NATIONAL LAUNCH VEHICLE STUDY - Mr. Malaga, the NASA cochairman of the cost panel for the National Launch Vehicle Study, has indicated that the results of the cost study will be presented to the Launch Vehicle Panel (cochairmen Dr. Flax of USAF and Mr. Rosen of NASA) of the AACB on November 19. It is planned that the report to the full AACB will be made at the November 30 meeting of that board.

We continue to have doubts and reservations about what has been included in the computer cost model. Further, we have reservations that the impact of technical influences on costs have been adequately considered. At Dr. Rees' request, we are preparing a formal letter for your signature, summarizing our analysis of the study situation, areas of disagreement, and specific recommendations. ✓

Milton Rosen has concluded that the overall report (technical and cost aspects) will not be forwarded to the centers for review before submission to AACB.

Attached (Dr. von Braun's copy only) is a status report from Woody Bethay, which gives some additional details. ✓

Harry
Request briefing
as soon as
you have Hq.
reaction.
This thing
is TNT
B

11/16/64 NOTES McCartney

B 11/19

7w 1/16

Her name is Jerry McC
Let's discuss impact of this reduction in conjunction with our other problems (i.e. space etc)
B

1. PROGRAM AUTHORITY PLAN 64-4: R&D Operations (Mr. Weidner) and Industrial Operations (Mr. Hueter) have agreed to an overall reduction of approximately \$41M in the FY-65 R&D Operations' budget. Twenty-two million dollars of this has been identified by stage and laboratory where cuts will be applied. The remaining \$18M has been identified by stage where reductions will apply but has not yet been apportioned among the laboratories. Coordination will continue with Industrial Operations and the laboratories concerned to complete the apportionment of the \$18M. ✓

2. NASA HEADQUARTERS APOLLO TEAM REVIEW OF POP 64-4: R-RM, in support of Executive Staff, participated in a review of the Program Obligation Plan 64-4 with a team from NASA Hq. Areas of interest included:

- a. FY-65 Funding - detailed justification by line item.
- b. Manpower - Relationship of our manpower planning to the overall budget. ✓
- c. Cost - versus obligations.
- d. Rate of obligations against the overall Program Obligation Plan. Indications are that future submissions of the POP will require more detailed, specific justification than has been submitted in the past. ✓

3. PHYSICAL SEPARATION OF CONTRACTOR AND CIVIL SERVICE PERSONNEL IN R&D OPERATIONS: A survey was made of laboratory facilities to determine the progress being made in physical separation of contractor and Civil Service personnel in accordance with the policy for Single Support Contractors. Results of the survey indicate that substantial progress has been made. Completion of this effort will be realized by the time the Single Support Contractors have been selected and are on board. ✓

4. CONCEPTUAL STUDIES USING CofF ADVANCED DESIGN FUNDS: In response to a request from the Assistant Director for Facilities, R&D Operations' facilities are being surveyed to determine required modernization and modification. An R&D Operations' position is being developed and will be submitted to Mr. Shepherd very soon. If the survey indicates that modernization is needed, it appears likely that Advanced Design Funds from the CofF appropriation will be made available from NASA, Headquarters. ✓

11/16/64 NOTES McCartney

B 11/19

7w 11/16

Hermann B.
Jerry McC
Let's discuss
impact of this
reduction in
construction
with our
other problems
(i.e. spaces etc.)
B

1. PROGRAM AUTHORITY PLAN 64-4: R&D Operations (Mr. Weidner) and Industrial Operations (Mr. Hueter) have agreed to an overall reduction of approximately \$41M in the FY-65 R&D Operations' budget. Twenty-two million dollars of this has been identified by stage and laboratory where cuts will be applied. The remaining \$18M has been identified by stage where reductions will apply but has not yet been apportioned among the laboratories. Coordination will continue with Industrial Operations and the laboratories concerned to complete the apportionment of the \$18M. ✓

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fw 11/16

B 11/19

NOTES 11/16/64 RUDOLPH

1. Saturn V Soft Release Mechanism - In response to a request from KSC, an investigation was conducted on the need for retaining the Saturn V soft release mechanism in view of the lowered lift-off acceleration. Indications are that although the number of mechanisms may be reduced (presently 16 are used), a basic need for soft release remains. A letter to be forwarded to KSC is being prepared to this effect. ✓

2. Saturn V Component Qualification Test Director - Effective November 16, 1964, Mr. Jewell W. Moody is announced as Chief of the Saturn V Reliability and Quality Office. ✓ As an additional assignment, Mr. Moody is appointed to the position of Saturn V Component Qualification Test Director. ✓ In this capacity, he is authorized to make Saturn V Program decisions necessary to assure successful culmination of the Saturn V Qualification and Reliability Test Program within program constraints. ✓

3. S-IC-D Bulkhead - Boeing is still having problems with the S-IC-D bulkhead. The Material Review Board at Michoud is studying the bulkhead because of another weld mismatch. A first assessment indicates the need to cut out the reweld one meridian weld. It appears that the bulkhead welding problem will be the primary source of delay for the S-IC-D stage. ✓

*fw 4. S-II Stage:

Split Aft LOX Bulkhead (S-II-S) - The cause of the aft LOX bulkhead failure has been tentatively determined to be a bad weldment in the area of the recirculation system cover plate. Further analysis at S&ID and MSFC is continuing before a final conclusion is made. ✓

S-II Battleship Status - At 11:53 am, CST, on November 9, 1964, the first hot firing of the S-II battleship took place. The test was an ignition only (fuel blowdown) test and all indications are that it was completely successful. A three second battleship mainstage firing is scheduled for the week of November 16, 1964. ✓

S-II Manpower and Task Survey - The evaluation of manhours has been completed, however, no definite conclusions regarding funding requirements have been reached. ✓

fw 11/6

NOTES-11-16-64-SHEPHERD

B 11/19

No Notes

Tw 11/16

NOTES 11-16-64 Stuhlinger

B 11/19

E.S.
Please check date with me before you finalize it. I'll be out of town for about 1/2 the time in Feb. and would like to be present B

1. RESEARCH RESULTS DOCUMENTATION: After our proposed plan for research program consolidation, including the documentation of research results, was accepted in principle by R&DO last week, we prepared a plan for the first annual presentation "Research at Marshall," to be held in February 1965. This plan will be submitted to the R&DO Laboratories and to IO this week.

2. GE CAPABILITIES AT VALLEY FORGE: During a full-day visit of the GE laboratories at Valley Forge, I was particularly impressed by the environmental test facilities. The Pegasus spacecraft is presently under vibration testing there. MSFC should try to utilize these facilities also in other test programs. ✓ We will, but they're expensive. B

3. SNAP-50 DEVELOPMENT: I attended a very interesting briefing on SNAP-50 at the Canel facility (Hartford, Conn.), a government-owned factory operated for the AEC by Pratt & Whitney. In former years, the nuclear-powered airplane engine was developed there; at present, the factory develops the reactor and the heat exchanger systems for the SNAP-50. Although a remarkable success was achieved recently with the 10,000 hour operation of a Lithium-Columbium heat exchanger system at 2,000°F, overall progress is very slow because of lack of funds. Development of the booster and the turbo-generator at the Garrett Corporation is even in a poorer condition, and the development of the space radiator has not even been contracted as yet. At the present pace of progress, the development time will be much longer than the originally anticipated 10 to 12 years. Yearly funding at present is about 20 M; it should be 50 to 100 M now, and 100 to 150 M in a few years. The fear of a "power gap" in the US space program is rapidly growing.

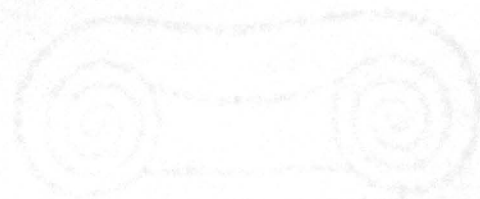
E.S.
I made a pitch for SNAP-50 before the Named S.F. Exper. Board in connection with the broadcasting TV satellite, but got only polite interest. B

4. ACE SCIENTIFIC MISSION: We are maintaining close contact with Dr. Shoemaker and his associates at the University of Arizona in connection with our ACE (Apollo Capability Extension) scientific mission activities. His group is aggressive, enthusiastic and very competent and our work will definitely benefit from the association. ✓ Of particular importance is their lunar scientific mission simulation being carried out in the laboratory and in the field. ✓

As requested by Don Beattie at OMSF, we recently reworked our Lunar Scientific Program to fit the Stationary Shelter concept rather than the MOLAB concept. Fortunately, this was possible without profound changes. May we give a one hour presentation to you on the Lunar Scientific Mission Plan? Yes, please (via Bonnie) B

E.S.
How is your interim (not just yearly) improved visibility program for research results taking shape? B

November 23, 1964



ELITE

PERCOTTON

ACID FREE

R&D OPERATIONS

| CODE | NAME | INIT. | <input type="checkbox"/> ACTION <input type="checkbox"/> INFORMATION |
|------|---------------|-------|---|
| DIR | Dr. von Braun | | |
| | B | | |
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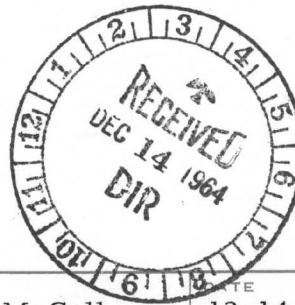
REMARKS

Attached information is in reply to your comment on item 3 of Mr. Dannenberg's 11-23-64 NOTES.

File

SHOW DIRECT

fw 17/15



| | | |
|---------------|----------------------|------------------|
| CODE R-DIR | NAME J. C. McCall | DATE 12-14-64 |
|---------------|----------------------|------------------|

23
NOTES 11-23-64 DANNENBERG

1. Saturn IB-Titan III Cost Comparison - A review of the latest Headquarters computer run of the cost model indicates that the Saturn IB costs are not too far from the MSFC estimates. However, it is still questionable whether the model is realistically costing the Titan III Program. ✓

2. Experiments - The Army has withdrawn the "Radar Sphere" proposal for SA-10 without explanation. (We presume they were redirected to use the Titan III.) ✓

Both Douglas and Boeing are showing (unsolicited) interest in experiment planning of their own. ✓ We are keeping in touch with them. ✓

Headquarters intends to have GE/Daytona write the Apollo Experiments Guide with Center support. ✓

3. Flight Operations - An internal memo from Captain Holcomb to General Phillips (shown to Dr. Kuettner) points out the lack of MSFC to focus in on a solution of the flight operations responsibilities.

4. S-II Design Reviews - In reference to NOTES 11-16-64 DANNENBERG, the mentioned question concerning authority for design approval by a single laboratory has not been completely resolved. Meetings are scheduled during this week with laboratory personnel to arrive at an R&D Operations position. As soon as this position has been identified, you will be informed by separate memo of the outcome, which should answer your comment on the referenced notes. In the meantime, the scheduled design reviews of the 18 systems in the S-II stage continue. The benefits of these design reviews will be reviewed after the 6-month trial period has been completed.

K.D.
Please
fill me
in on
details
oral or
1/2 hr
briefing
B

OK
11/20

Please attach
11-23-64 Dannenberg NOTES
this forthcoming reply B



December 14, 1964

Subject: Minutes of December 9 Flight Operations Meeting

1. The subject meeting was held in Dr. McCall's office with the following attendees:

| | |
|---------------|------------|
| Dr. McCall | R-DIR |
| Col. O'Connor | I-DIR |
| Mr. Balch | DEP-T |
| Mr. Bramlet | I-V-MGR |
| Mr. Rowan | I-V-F |
| Mr. Reinartz | I-I/IB-MGR |
| Mr. Cooper | I-I/IB-F |
| Dr. Speer | R-AERO-F |
| Mr. Magliato | R-DIR |

2. The purpose of the meeting was to discuss the MSFC role in flight operations and to develop our plans for establishing a well-defined management scheme for this effort. Salient points made, or action items established, are as follows:

a. Dr. McCall briefly summarized for Col. O'Connor how this study effort got going and what has been done to date.

b. Col. O'Connor was invited to accompany Dr. McCall and Mr. Balch on their trip to KSC and Headquarters on December 15 and 16, for discussions on flight operations and mission operations. MSC will probably be visited after the holidays.

c. Dr. McCall requested that I. O. be furnished a copy of the draft MSFC/MSFC agreement on flight controllers. This draft (Enc. 1 to this memo) reflects Dr. McCall's comments on the December 4 draft, plus the points made in this meeting, i.e., providing the MSFC flight controllers with stronger ties with MSFC (return often for meetings, discussions, orientation, etc.) and having stronger MSFC administrative control (we pay for travel, etc.).

d. Mr. Magliato was requested to provide Col. O'Connor with pertinent backup and historical information regarding flight operations. This information is being forwarded to Col. O'Connor by separate memo.

Subject: Minutes of December 9
Flight Operations Meeting

December 14, 1964

e. Dr. Speer mentioned that the Headquarters' Mission Operations organization (to be headed by Christensen) has just been approved, according to information received from Capt. Holcomb.

f. Dr. Speer discussed a list of specific problems in MSFC flight and mission operations. Copies are attached as Enc. 2 to this memo. It was mentioned that many of the management problems will essentially be settled when a formal MSFC flight operations (or mission operations) organization is established.

g. Dr. Speer mentioned that with the establishment of the Headquarters Mission Operations organization, we must expect that there will soon be an urgent request to the centers to provide personnel for the Operations Support Requirements Office (OSRO). This staffing would probably have to start in January 1965. The MSFC representative(s) must be attached to the appropriate office or organization here at MSFC.

h. It was brought out that a MSFC position paper is required which will define the interrelations between, and relative involvement of, I. O. and R&D Operations in the areas of flight operations and mission operations. A memorandum of agreement would be jointly approved by Mr. Weidner and Col. O'Connor.

i. It was agreed that there are four major documents which must be developed in conjunction with establishing a flight operations organization at MSFC. These are:

- (1) The memorandum of agreement outlined in (h) above.
- (2) The MSFC/MSC agreement on resident flight controllers at MSC
- (3) A MSFC/KSC agreement on flight operations (possibly a portion of the overall MSFC/KSC agreement)
- (4) The final detailed organizational papers (organization charter, detailed job descriptions, organization description, staffing plan, etc.)

Subject: Minutes of December 9
Flight Operations Meeting

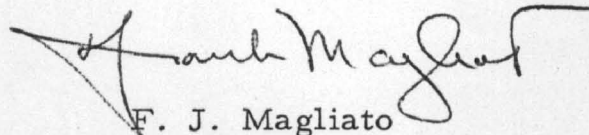
December 14, 1964

j. Dr. McCall proposed that an interim center spokesman for the total area of flight and mission operations be appointed, and that the spokesman be Dr. Speer. Since Col. O'Connor had left the meeting prior to this proposal, it was agreed that this suggestion would be discussed during the forthcoming visit to KSC and Headquarters. A final decision on Dr. McCall's proposal will be made at the next Flight Operations Meeting in Dr. McCall's office on December 17 (2-4 p.m.).

k. Mr. Bramlet asked about the ability or authority of our representatives in the Joint Operations Group (JOG) to make commitments for the Center. Dr. Speer stated that JOG meetings are primarily internal to identify problems affecting flight operations and that center commitments are not normally made during these meetings. Dr. McCall said that in the Panel Review Board (chaired by Gen. Phillips, with MSFC representation of Dr. Rees, Dr. McCall and Col. O'Connor) decisions are made which are center commitments. Dr. McCall suggested that we look at the authority and responsibilities of the JOG (also chaired by Gen. Phillips, with MSFC representation of Speer, Bramlet, Kuettner and Hoberg) to see if the representation of MSFC should be shifted up to top management.

l. Mr. Bramlet brought up the P&VE request to I. O. to obtain contractual coverage for Douglas (DAC) participation in the Flight Controller Office at MSC. The P&VE request is being sent back to R&D Operations so that it can be combined with the total DAC and IBM requirements and revised to reflect current thinking as to how this effort will be handled.

m. Col. O'Connor will appoint, by December 14, a man to represent I. O. in the efforts to define the total task of flight operations and to develop the details of the management organization necessary to perform the job. Mr. Bramlet will handle this until a replacement is named.


F. J. Magliato
Staff Assistant
R&D Operations

2 Enc:
As stated

Copies to: (See page 4)

Subject: Minutes of December 9
Flight Operations Meeting

December 14, 1964

Copies to: Dr. von Braun, DIR
Mr. Rees, DEP-T
Mr. Balch, DEP-T
Dr. McCall, R-DIR
Col. O'Connor, I-DIR
Mr. Bramlet, I-V-MGR
Mr. Reinartz, I-I/IB-MGR
Dr. Speer, R-AERO-F
Dr. Kuettner, R-SA

MSC - MSFC Agreement
MSFC Flight Controller Office at MSC

I. Scope

It is the scope of this agreement to formally recognize the existence of the MSFC Flight Controller Office at MSC, and to define its organizational status, functions, authority, relationship to other organizations, and logistics and other support from the MSC Flight Operations Directorate.

The establishment of this resident MSFC office at MSC recognizes the need for especially-trained engineering design and development personnel to actively participate in the mission control operations of their space vehicle systems.

The agreement is designed to develop a launch vehicle flight controller team fully integrated into the mission control center while maintaining its full cognizance of the launch vehicle design.

II. Organization

1. The MSFC Flight Controller Office (hereafter referred to as "the Office") is an element of MSFC Research and Development Operations (R&DO), representing MSFC officially in its Flight Operations function at MSC.

2. During non-mission periods the Office will report to the Director, R&DO, or his delegate. However, in performing its functions at MSC, the Office will be responsive to the Chief, MSC Flight Control Division.

3. During Saturn-Apollo mission periods the members of the Office integrated into the Apollo Flight Control Team will respond to the authority of the Apollo Flight Director irrespective of its normal reporting channels.

4. The Office Chief will be appointed by the MSFC Director of Research and Development Operations with concurrence of the MSC Assistant Director for Flight Operations.

5. The initial size of the Office will be 20 technical personnel (Civil Service and Contractor) with adequate clerical and secretarial support stationed at MSC. Any adjustment in the size and organization of the Office will be established by supplemental agreement between the MSC Assistant Director for Flight Operations and the MSFC Director of Research and Development Operations.

III. Functions

1. The Office will serve as technical link between MSFC and the MSC Flight Operations Directorate in the area of flight operations planning and training simulation.

2. The Office will establish requirements for necessary MSC facilities serving flight operations functions for the S-IVB/IU.

3. The Office will assist in establishing requirements on GOSS for the S-IVB/IU flight control.

4. The Office members will perform all real time Saturn Launch Vehicle flight control functions at the IMCC and the remote sites. The MSFC flight controller activities at the IMCC will be supported from the Launch Control Center, Cape Kennedy, and the Huntsville Operations Support Center.

5. As activities permit, Office members will be periodically recalled by MSFC for adequate time periods to maintain their technical cognizance of launch vehicle design and operations.

6. A limited number of additional MSFC personnel will participate in selected Apollo flight controller training activities at MSC. During mission periods this group will be assigned to the Huntsville Operations Support Center at MSFC.

IV. Authority

1. The Office Chief is authorized to represent and commit MSFC in technical decisions and recommendations concerning flight controller activities. Such activities include flight controller selection, training, and deployment; preparation of S-IVB/IU orbital operations plans, generation of related support requirements; and other associated technical activities.

2. Any basic MSC and MSFC management commitments regarding flight operations (such as additional manpower, funding, over-all schedules, and other additional resources) will be negotiated between the MSFC Director of Research and Development Operations and the MSC Assistant Director for Flight Operations.

3. During mission periods MSFC will transfer full authority over the MSFC Flight Controllers Office to the Apollo Flight Director within established operations plans. Operations plans will define the start and duration of each mission period.

V. Relationship to Other Organizations

1. The Office, as an MSFC line element, will be subject to the established Saturn-Apollo Coordination Panel authorities. The Office will be represented on all panels directly affecting its functions.

2. The established relationship of the existing resident MSFC Liaison Office at MSC with the MSFC Flight Controller Office will remain unchanged. The latter Office's functions are restricted to flight operations.

VI. Effectivity and Implementation

1. This agreement will be effective immediately on the date of issuance. Implementation will be executed such that the resident MSFC Flight Controller Office is in full operation by July 1, 1965.

2. Any basic change to this agreement or the supplement will be brought to the attention of both Center Directors and may have to be validated by formal revision to this agreement.

Robert R. Gilruth
Director
Manned Spacecraft Center

Wernher von Braun
Director
Marshall Space Flight Center

Supplement - MSC Logistic and Other Support to
the MSFC Flight Controller Office at MSC

1. The MSC Directorate of Flight Operations will furnish the Office adequate office space, furniture, communications, reproduction and printing service, and office supplies for the full team contingent to permit it to accomplish its functions.

2. The MSC Center Medical Office will conduct the qualifying medical examinations for prospective MSFC flight controllers and the annual re-examinations of members of the MSFC Flight Controller Office.

3. Prior to deployments of Office members for mission activities the MSC Directorate of Flight Operations will make all necessary arrangements such as transportation, passports, inoculations, etc. All costs for these arrangements for MSFC personnel will be defrayed by MSFC.

4. Administrative support of a financial nature for MSFC Civil Service personnel will be handled as follows:

a. Budgeting and Funding - MSFC will be responsible for budgeting and financing all the personnel services costs of personnel permanently assigned to the MSFC Flight Controller Office at MSC. Funds will be provided by MSFC sub-allotment to MSC.

b. Payroll and Travel - MSC will provide payroll and travel services for MSFC personnel permanently assigned to the Office at MSC, including, but not limited to providing and processing of time and attendance records, processing of payrolls, distribution of payroll checks and bonds, travel fund certification, processing of transportation requests, processing and payment of travel advances and reimbursement vouchers, labor reporting, etc. in the same manner and degree as provided for MSC employees. Certification of time and attendance and authorization or approval of official temporary duty travel for MSFC personnel assigned to the Office at MSC will be accomplished by the duly designated Office Chief or a member of the Office acting in this capacity during the Office Chief's absence. Temporary duty travel in excess of 90 days, permanent change of station travel, or travel in connection with initial duty station assignment for the members of the Office must be approved by the MSFC Director of Research and Development or his delegate.

c. Reporting - MSC will report labor distribution, manpower utilization, and travel to NASA Headquarters in accordance with established NASA Headquarters procedures for reporting on sub-allotments. In addition, MSC will provide the MSFC Financial Management Office (FIN-A) with highlight data on the status of MSFC sub-allotments by telephone or wire on the last working day of each month, followed up by details at Headquarters reporting levels, as prescribed in the Headquarters procedures for reporting on sub-allotments received.

d. Other - MSC will notify MSFC (FIN-A) when new Civil Service personnel for the Office report for duty. MSC will provide MSFC (FIN-A) with a copy of the biweekly pay vouchers covering the payroll for MSFC Office personnel assigned to MSC. The MSFC organization responsible for the Office will provide weekly Time and Attendance Distribution Cards for all Civil Service Office members to the MSFC Financial Management Office (FIN-A) for MSFC internal reporting of labor distribution. These reports will be reconciled to the pay vouchers provided by MSC.

5. The Lead member of each MSFC contractor group in the Office is responsible for the time and attendance reporting, payroll, and travel activities, and other group support arrangements in accordance with company and contract-established policy and regulations.

Specific Problems in MSFC Flight Operations

1. MSFC's General Role

Trend from vehicle development to operations
Launch vehicle portion of mission control
Feedback of operations into design and development
MSFC mission control for certain missions

2. Assignment of Flight Operations Tasks

Mission operations planning
Huntsville support operations
Local KSC operations support
Resident MSC operations support
Resident MSF OSRO personnel
LIEF project management
Operations documentation

3. Flight Controller Team at MSC

Center agreement MSC-MSFC
Manpower
Contractor participation
Organizational relationship to MSFC

4. I. O/R&DO Operations Interface

Operations documentation
Prime vs. divided Operations responsibility
Staffing of OSRO
Define mandatory concurrence chain
Senior representation in Joint Operations Group
Is Joint Operations Office feasible ?

5. Response to MSF Operations Organization

MSF Mission Operations Office
Holcomb's Office
OSRO
Single MSFC point of contact for MSF

6. Role of Flight Operations in KSC-RFP

MSFC's role during mission period

Participation in Mission Director's assessments

Participation in launch activities

Participation in flight control

B 11/22

F-1 ENGINE

During this report period, the first Flight Rating Test was conducted on schedule (November 16, 1964) on engine system 2004 in Test Stand 1A. This was a "hypergol fails to establish ignition" test and was the first of twenty planned safety limits tests for this engine. All objectives of the test were achieved. Engine F-2006, which has been designated as the FRT calibration engine, has completed acceptance testing and review of the records prior to formal acceptance of the engine is in progress. ✓

A meeting was held at Rocketdyne early this month between Rocketdyne, Aerojet, Lewis Research Center, and MSFC for the purpose of comparing turbo-pump design and test experience particularly relative to the seal design approaches used in turbopumps. This meeting was sponsored by MSFC/LeRC at LeRC suggestion and was considered a very valuable exchange of information and experience by all parties participating. ✓

RL10 ENGINE

The decision to use the uprated Isp RL10 engine for Atlas-Centaur Vehicles #11 and subsequent has been firmed up by LeRC. This increase in performance (rather than the Atlas-Centaur weight reduction program) is being relied upon to achieve the required 2400-pound Surveyor payload weight. We will change the specification on 12 engines now on order to the uprated version in order to meet this requirement. ✓

Studies by Aeroballistics show that a 350-400 lb. payload increase (to escape) can be achieved on the Saturn IB/Centaur by using the uprated engine. (Payload gain for Atlas/Centaur is 250 lbs.) ✓

S-IV-8 was successfully static fired Friday afternoon. Performance of all engine systems looks good at this time. ✓✓

*fw

J-2 ENGINE

The PFRT program was completed last week with a total of 2261 seconds on engine 2008. ✓✓

Three production engines have completed the hot firing portion of acceptance test and are currently undergoing post test inspection and checkout prior to delivery. Two of them should be delivered to S&ID by November 30 for their Battleship program. Seven engines have already been delivered for stage use. ✓

A partial transition test was conducted on the center engine of the S-II Battleship on November 21. The test was successful from an engine standpoint. ✓

ATTACHMENT: Dr. von Braun's copy only

1w 4/23

NOTES 11-23-64 CLINE

B 11/29

1. NUCLEAR PULSE (ORION): (Reference NOTES 11-16-64 CLINE, paragraph 5) Recommend that if NASA is willing to go forward with the ORION concept, MSFC be the focal point for NASA coordinated effort. Certain conceptual studies should be made by AEC due to the fact that NASA does not have experts in many areas of concern. MSFC should be the focal point, since the concept, either in propulsion or launch vehicle, is MSFC mission responsibilities.

F.C.

Agree.
What specific
steps do you recommend at
this time? A letter to HQ?
Specifically, to whom?
B

NOTES 11/23/64 CONSTAN

Tw 11/23

B 11/23

1. SI-IB

Routine operations continue on all vehicles. S-IB-1 went into pre-static checkout on November 20. ✓

2. S-IC

Bulkhead Welding - The first bulkhead for the D Vehicle was welded to the Y-Ring November 22. With the assistance of ME Laboratory personnel, the welding operations seem to be improving. The meridian welds on this bulkhead are much improved over previous. The Y-Ring to bulkhead weld looks good, but has not as yet been shaved and X-rayed. ✓

Jul 23

NOTES 11-23-64 DANNENBERG

1. Saturn IB-Titan III Cost Comparison - A review of the latest Headquarters computer run of the cost model indicates that the Saturn IB costs are not too far from the MSFC estimates. However, it is still questionable whether the model is realistically costing the Titan III Program. ✓

2. Experiments - The Army has withdrawn the "Radar Sphere" proposal for SA-10 without explanation. (We presume they were redirected to use the Titan III.) ✓

Both Douglas and Boeing are showing (unsolicited) interest in experiment planning of their own. ✓ We are keeping in touch with them. ✓

Headquarters intends to have GE/Daytona write the Apollo Experiments Guide with Center support. ✓

3. Flight Operations - An internal memo from Captain Holcomb to General Phillips (shown to Dr. Kuettner) points out the lack of MSFC to focus in on a solution of the flight operations responsibilities. ✓

4. S-II Design Reviews - In reference to NOTES 11-16-64 DANNENBERG, the mentioned question concerning authority for design approval by a single laboratory has not been completely resolved. Meetings are scheduled during this week with laboratory personnel to arrive at an R&D Operations position. As soon as this position has been identified, you will be informed by separate memo of the outcome, which should answer your comment on the referenced notes. In the meantime, the scheduled design reviews of the 18 systems in the S-II stage continue. The benefits of these design reviews will be reviewed after the 6-month trial period has been completed.

K.D.
Have they
seen
difference
in payload
capability
into
account?
B

K.D.
Please
fill me
in on
details.
Oral or
1/2 hr
briefing
B

OK
11/20
Bowie

Please attach
11-16-64 Dannenberg NOTES
with this forthcoming reply B

fw 11
23

NOTES 11-23-64 FORTUNE

B 11/29

1. Utilities Coming on Line - The No. 2 transformer, which failed on previous energizing, has been replaced by Westinghouse, connected up, and placed in operation. The basic natural gas system is operational. Check-out of our Central Heating Plant is proceeding. ✓

2. Mr. Earl Hilburn visited MTO Tuesday - I met Messrs. Hilburn and Hueter at Michoud that afternoon, flew with them by helicopter to the Site and around the various construction scenes. We landed by the Horn, briefed Mr. Hilburn on our programs for about 20 minutes in the Acoustic Facility, then flew them back to Moissant Airport. Mr. Hilburn said Dr. Seamans was so enthusiastic about his visit to MTO that he invited Hilburn to come over to see it. ✓✓

fw 11/23

B 11/29

NOTES 11/23/64 GEISSLER

1. Payload Candidates for Saturn IB and V: Langley Research Center is currently studying several payload candidates (MORL, orbital experiments, etc.) for the Saturn IB and Saturn V vehicles. On a recent trip to Langley, Aero-Astrodynamics personnel discussed these payload studies with Langley personnel. Review of some of the preliminary payload shapes as listed above indicated that the external configurations are in general agreement with MSFC's thinking. The main question raised was the length and volume of payloads that could be flown on Saturn vehicles. Langley was asked to keep us informed and supply us with aerodynamic data generated from their studies. We have loaned them model components for wind tunnel tests. ✓
2. NASA Research Advisory Committee on Space Vehicle Aerodynamics: On Nov. 16 and 17 I attended a meeting of the NASA Research Advisory Committee on Space Vehicle Aerodynamics. Main items of discussion were recovery of ballistic vehicles and planetary atmosphere studies. There was among others, a presentation on a very systematic investigation on the total area of aerodynamic decelerators by the Air Force Flight Dynamics Laboratory, covering problems like deployment, drag, stability and control from the hypersonic through the terminal phase for single and clustered parachute canopies. Most of this work is done at University of Minnesota and the effort is on a rather modest budget (\$1.5 million). It was the opinion of most participants that this area should get somewhat more encouragement especially concerning the strength of materials at high temperatures. The paraglider did not get a very good rating by MSC for manned capsule landing (too high horizontal speed; high weight). ✓ Presentation by OSSA (Hearth) on the Mars landing program indicated fairly strong reservation against use of the S-IB/Centaur in 1969 or 1971 (they said again that they hardly knew how to use the payload) and resentment of the elimination of a 1966 attempt at Mars. They also stated that they did not believe a 1969 attempt would come to pass (in view of budgetary difficulties). Meeting minutes are forthcoming. ✓
3. Saturn IB/Minuteman: In order to estimate the performance, controllability, and load increases on the proposed Saturn IB/Minuteman, experimental aerodynamic information is mandatory. ✓ Sufficient data are being obtained at a minimum cost by adding to presently scheduled CCSD Saturn IB wind tunnel programs to support the proposed study which starts in December. ✓ The Ames-Langley-Lewis Centers have been most cooperative in supporting this program. ✓
4. Guidance and Control Implementation Sub-Panel Meeting: Subject meeting was held on November 17, 1964. A preliminary copy of action items and agreements is attached as enclosure 1. The Guidance and Performance Sub-Panel held a meeting on November 18, 1964. Action Items and Agreements will be forwarded at a later date. ✓

NOTES 11-23-64 GRAU

B 11/29

7w 11
23

1. S-IU-8 INSTRUMENT UNIT CHECKOUT: Systems checkout of the S-IU-8 Instrument Unit continues to be delayed pending rework of 44 vehicle cables containing recessed pins. It is expected Manufacturing Engineering Laboratory will complete rework of the cables today and systems checkout will begin 11-26-64. In that systems checkout has been delayed longer than was anticipated, re-evaluation of the presently scheduled release date of December 27, 1964 is underway. ✓
2. S-IV PROGRAM: The S-IV-8 stage was fired November 20, 1964, and test results are now being evaluated. A reduced post static checkout schedule has been adopted in order to meet schedule commitments and to enable DAC to phase in the S-IV personnel at SACTO to the S-IVB effort (Stage 201). ✓ S-IV-10 stage is in the Engineering and Development Building at SACTO undergoing rework and modification while waiting for the test stand to be cleared of S-IV-8. Static firing is scheduled on January 20 and shipment to KSC on February 18, 1965. This stage will undergo a reduced post static checkout also. The S-IV-9 stage is undergoing some modification in the Engineering and Development Building at SACTO. Post static checkout has been accomplished on this stage and it is awaiting shipment to KSC. A sequence wiring problem has been uncovered which may cause a minor delay in shipment. ✓
3. CALIBRATION ACTIVITY: KSC and MSC have requested copies of the calibration procedure used by our calibration facility. They also request all information pertaining to our system for controlling. Packages are being prepared to send to both Centers. Both KSC and MSC are establishing large new calibration laboratories. *D.F. Meaning we are falling behind? p*
4. INSPECTION CRITERIA DEVELOPED TO PREVENT UNNECESSARY REWORK AND REJECTION OF SOLDERED CONNECTIONS: Based on a series of carefully monitored vibration and tensile tests, an acceptable range of soldered connection within the configuration required by the applicable specification has been established to provide plus - minus tolerances as an inspection criteria. While the preferred configuration is desirable, the tolerance permitted should prove to be financially beneficial to both the customer and the contractor. ✓ Display boards and the test results to demonstrate this range of acceptability, and to provide a basis for comparison, training and inspection, are available. ✓

NOTES 11/23/64 HAEUSSERMANN

B 11/29

1. PEGASUS ELECTRONIC CANISTER TESTING AT THE GENERAL ELECTRIC VALLEY FORGE TEST FACILITY: Vibration tests completed on 11/19. Data is presently being evaluated and results will be reported in next week's notes. ✓

Tw 11/23

11/23

Bull

NOTES 11/23/64 HEIMBURG

- * 1. F-1 ENGINE: Test TWF-038 was conducted on 11/20 for a mainstage duration of 5.67 seconds. This was the first of a series of four tests to determine thrust buildup and decay rates with the 30% full bypass thrust chamber and the Block II gas generator. Performance was lower than desired so the gas generator lox orifice will be enlarged for test TWF-039 scheduled ~~for today, 11/23,~~ at 4:20 p.m. ~~to be conducted on~~ ✓
 - * 2. S-II BATTLESHIP: A successful transition test was performed on 11/21/64, with no major malfunctions noted. A mainstage firing is now scheduled for Tuesday, 11/24/64. ✓
 - * 3. S-IV-8: The full duration firing (475 seconds 1/2% fuel mass depletion cutoff) was successfully completed on 11/20/64, without major malfunctions. ✓
 4. S-IVB: The countdown for a transition test was started on 11/21. The test is scheduled for 11/24. ✓
 5. F-1 TURBOPUMP TESTING: Two F-1 Turbopump Tests were conducted on 11/12 with duration of 1.5 and 3 seconds, respectively. These tests completed the F-1 Turbopump transient investigation. There were no significant temperature or pressure spikes during these tests. ✓
- On 11/21, the first mainstage test was conducted for a duration of 19.2 seconds. A preliminary investigation of the data revealed that all test objectives were fulfilled and that the recorded parameters were within their expected ranges through the test. During the next few tests emphasis will be placed on more closely simulating F-1 engine operation in the stage configuration. ✓
6. TRANSPORTATION: The Barge Palaemon was transferred to the Projects Logistics Office for operation on 11/19. ✓

ATTACHMENT 1: Note to Dr. von Braun & Mr. Weidner only.

fw
11/23

B 11/29

NOTES 11-23-64 HOELZER

1. KSC COMPUTER TRANSFER: The accountability of the computing hardware furnished to KSC by MSFC over the past few years has been transferred to KSC. The GE (Phoenix) personnel now furnished KSC by MSFC are being phased out, with a completion of the phase out to be accomplished by January 1, 1965. The Computation Laboratory and the computation group at KSC will continue to work very closely together and, in particular, will cooperate in the installation of the large scale computer in the Central Instrumentation Facility, MILA, next year. ✓
2. SLIDELL COMPUTER BOARD MEETING: The quarterly meeting of the Slidell Computer Board was held November 19, 1964. Major discussions centered around the status of the present computing facilities with plans for expansion in the future. A great deal of emphasis in the meeting was placed on the control of the use of computing resources. The prime contractors were again asked to survey their internal management procedures and assure that effective controls are utilized in the authorization for expenditure of resources in the computer field. ✓
3. INSTALLATION OF NEW ANALOG COMPUTERS: Two Electronic Associates 231R-V computers were received at the Slidell Computer Facility during the past week and their installation is proceeding satisfactorily. The installation of these two computers increases the total number of analog consoles at Slidell to six. No additional expansion of this number is planned. ✓

The Electronic Associates 231R-V computer for expansion of the decentralized HIC Building facility was received, but it cannot be installed because of the delay in completing the necessary power and air-conditioning additions. Installation will probably be delayed until December 20. ✓

Jul 11/23

NOTES 11/23/64 JAMES

*fw SA-9: S-IV-9 and S-IU-9 were erected on November 19 and checkout is proceeding on schedule. ✓

S-IV-8: S-IV-8 static firing attempt was aborted on November 19 due to below redline engine LOX inlet temperature at prestart and start. A successful firing of approximately 476 seconds was conducted on November 20 with no apparent problems. ✓

*fw PEGASUS: The acceptance test procedure of the Pegasus A electronic canister at ambient temperature was successfully completed last week. ✓ The canister is being mounted on the test fixture and preparations made to start thermal vacuum test early this week. Testing of this canister is approximately one week behind schedule with a low probability of recovering this time. However, we are utilizing the preprototype canister to continue some tests on the flight capsule which may aid in recovering a portion of the week mentioned above. ✓

*fw S-IVB BATTLESHIP: The S-IVB battleship firing test planned for last week has been delayed until at least Tuesday, November 24. The details of the delay are as follows: (1) As a result of a leak test late on Nov. 17, it was discovered that a part of the LOX pre valve lip seal was missing. This is the same valve that sustained a damaged lip seal and cracked housing on a previous test. Partial disassembly and inspection of the engine LOX system was made and the major portion of the missing lip seal was recovered; (2) The valve has been removed and hand-carried to Clary (Los Angeles) for repair. Valve was returned over the past weekend; (3) An orifice has been installed in the pre valve control system to limit the valve closing time to 150 milliseconds. It is suspected that previous damage resulted from rapid valve closure; (4) DAC is fabricating a screen for possible installation below the LOX pre valve. No decision has been made yet as to whether the screen will be used. ✓

FLIGHT MISSION ASSIGNMENT DOCUMENT: (DR. MRÁZEK) We have been notified by Bellcomm that a revision to the Flight Mission Assignments Document is scheduled for December 11, 1964. A rough draft will be submitted to MSFC for review approximately one week prior to final release. We have received a preliminary draft from Headquarters containing MSC inputs. They have been given our comments. The LH₂ experiment for 203 and the "LEM alone" flight for 206 have been incorporated. ✓ The reason for the LEM alone flight is the strong possibility a Block II CM/SM not being available for 206. This radical departure from current configuration is being assessed.

L.J. "All-up" seems to come apart at the seams!!
What are we supposed to fly in the nose of 206?
A fully-loaded LEM plus the shroud of 203?
B

11/23

NOTES 11-23-64 Koelle

B 11/23

No NOTES this week.

7w
11/23

B 11/22

NOTES 11-23-64 KUERS

1. Boeing Welding Problems on S-IC-D Bulkhead: Referring to Dr. Rudolph's NOTES last week, concerning a critical repair need of meridian weld mismatch on the -D bulkhead, Manufacturing Engineering Laboratory sent a team of four people to Michoud. The repair was successfully accomplished. Two of our supervisors will stay with Boeing for some time in order to participate in the preparation for the meridian welding of the next bulkhead. ✓

2. Marshall Furnishes Electro-Magnetic Hammer Unit and Training to NAA: Seal Beach received a Pulse Power Unit and Hammer Coil from ME. Training of S&ID personnel for correction operations of distortion of S-II components is presently going on. ✓

3. Industry Relations: On request of the "Aerospace Industries Association of America", Mr. Wuenscher gave a presentation about the Role of the NASA-MSFC Manufacturing Engineering Laboratory in the Development of Space Projects" at the Aerospace Manufacturing Engineering Committee Meeting on November 12 in New Orleans. Representatives of the 30 largest Aerospace Companies were present. ✓

fw 11/23

B 11/29

1. POSSIBLE LOSS OF SPACES - We received an inquiry last week from Bothmer's office about the impact of a temporary transfer of 50 MSFC spaces to MSC until the end of Dec. We explained that our on-board strength plus commitments is very close to the ceiling, and that we could not agree to release of the spaces. Actually, the reason we are so near our authorized ceiling is that we have 124 temporary employees on board. For the moment, at least, it appears that headquarters will not press the issue.
2. MSFC GRADE/SALARY STRUCTURE - Preparations are continuing to compile the best possible impact statement and justification to be furnished to headquarters to alleviate the BOB restrictions on average grade and average salary. ✓
3. NATIONAL LAUNCH VEHICLE STUDY - The report of the National Launch Vehicle Cost Study Panel to AACB is scheduled for Nov. 30. A status report to Dr. Flax (Chairman, Launch Vehicle Panel of AACB, also Assistant Secretary of Air Force for R&D) and Milt Rosen was made as planned on Nov. 19. Only others attending were Mr. Malaga and Col. Seccomb, Co-chairmen of the Cost Study Panel. ✓

Mr. Malaga has advised that the computer printouts generated during this study will not be distributed. We have a man in Washington today to review and make extracts of data of interest to us. ✓

4. ADMINISTRATOR'S GENERAL MANAGEMENT PROGRAM REVIEW - APOLLO- Spaces have been obtained for seven MSFC representatives to attend Mr. Webb's Apollo Program Review, Wed. Nov. 25, as follows: Messrs. Belew, James, Rudolph, Shepherd, Fortune, Kuers, and Driscoll. ✓
5. DOD TASK GROUP MEETING - The DOD Task Group met in Washington on Nov. 18 to discuss the three Center's inputs and arrive at conclusions and recommendations to present to Dr. Mueller. The meeting went well and most of MSFC's recommendations, as discussed in Staff Luncheon Nov. 3, are being picked up and incorporated into an interim presentation to Dr. Mueller. ✓

Our Nov. 3 proposal outlined a way of reducing MSFC civil service requirements by 130 persons. At Joe Dickerson's request, we are making further study of the use of DOD personnel to replace MSFC contract administration personnel at the following plants, for a possible further reduction in MSFC civil service requirements:

| | <u>Approx. No. People Being Considered</u> |
|-----------------------------|--|
| S&ID | 6 |
| Rocketdyne | 8 |
| Douglas Aircraft | 8 |
| Pratt & Whitney | 4 |
| Michoud Operations | 100 |
| Mississippi Test Operations | 15 |
| Total Under Consideration | 141 ✓ |

fw
11/23

B 11/29

NOTES 11/23/64 McCartney

1. DISTRIBUTION OF NON-SATURN MANPOWER WITHIN THE LABORATORIES: (Reference your request on my 11/9/64 Notes, attached) The following tabulation indicates the percentage of overall R&D Operations'/civil service manpower used, through October, 1964, in Non-Saturn effort.

| Month | (*)Eng. Dev. | (**)SR&T | Adv. Studies | CofF | (***)Misc. | Total |
|----------------|-----------------|----------|-----------------|------|------------|-------|
| July 1964 | 1.5 | 7.0 | 2.7 | 1.0 | .7 | 12.9 |
| August 1964 | 1.6 | 7.0 | 2.5 | .9 | .9 | 12.9 |
| September 1964 | 1.6 | 7.1 | 2.5 | 1.0 | .8 | 13.0 |
| October 1964 | 1.7 | 7.0 | 2.8 | 1.2 | 1.0 | 13.7 |

* Engine Development includes H-1, RL-10, J-2, and F-1

** SR&T includes:

- | | |
|---------------------------------|----------------------------------|
| a. Launch Vehicle Technology | i. Aeronautics |
| b. Propulsion Technology | j. Human Factors Systems |
| c. Launch Operations Technology | k. Chemical Propulsion |
| d. Nuclear Electric Systems | l. SR&T (OTDA) |
| e. Nuclear Rocket Systems | m. Meteorological Systems |
| f. Nuclear Rocket Propulsion | n. Lunar & Planetary Exploration |
| g. Space Vehicle Systems | o. Geophysics and Astronomy |
| h. Electronics Systems | |

*** Miscellaneous includes:

- a. Centaur Procurement
- b. RIFT
- c. Pegasus
- d. Centaur Development
- e. Systems Engineering

Hermann Weidner
Referring again to my remarks on
McC's NOTES of 11-9-64, we
must discuss this 1.0. commitment
again. If necessary, we'll just have to

2. SOURCE EVALUATION BOARD: Mr. Cook has advised that support contract proposals have been received for all offices and laboratories. Evaluation has been completed of all proposals except that for the Research Projects Laboratory. With the assistance of the Resources Management Office in preparation of the final reports to the Source Selection Official, and with excellent support from MSO in preparing the oral presentation charts, it appears that the schedule can be met. A dry run at NASA Headquarters, before Mr. Reicke, Deputy to Dr. Mueller, is now scheduled for December 15. Presentation of all 10 reports to the Administrator is scheduled for December 17.

discontinue
some of
the above
listed
activities
B

NOTES 11/23/64 RUDOLPH

1. Systems Engineering and Integration Support - The Systems Engineering and Integration Support Contract is scheduled to have all MSFC approvals and be forwarded to NASA Headquarters for final approval on Wednesday, November 25, 1964. ✓
2. S-IC Stage Bulkhead Fabrication - Boeing has requested MSFC, ME Laboratory, to consider the possibility of affording some relief in Boeing's bulkhead situation by fabricating the lower LOX bulkhead for the S-IC-D and both LOX bulkheads for S-IC-F. This would gain about six weeks of schedule time for Boeing. ME Lab is looking into this possibility and will advise Boeing this week as to a decision. ✓
3. S-II Battleship - The S-II Battleship second firing test (transition, single engine) was conducted on Saturday, November 21, 1964, at 3:51 pm, PST (5:51 pm, CST). First look indicated success. Preliminary evaluation of data is scheduled for completion today, November 23, 1964. Mainstage test is tentatively scheduled for ~~Tuesday, November 24, 1964~~, pending results of the transition test last Saturday. *week of Nov. 30, 1964, ✓*
4. S-IVB/V Stage Cost - The Ad Hoc Cost and Program Review which was conducted October 19 thru November 13, 1964, to eliminate marginal requirements and contractor activities achieved its goal of reducing FY 65 projected expenditures on the Saturn S-IVB/V program by \$10.0 M. Although the over-all effect on runout costs has not been fully assessed, preliminary indications are a reduction of approximately \$35.0 M. ✓
5. Vehicle GSE Mission Support Contract - The Boeing Company is expected to have the Vehicle GSE Mission Support Contract work statement revised and back to MSFC by December 10, 1964. Preliminary in-house review will take place for a couple of days. Actual negotiations should begin around December 15, 1964. ✓

Ju 11/23

B 11/29

NOTES-11-23-SHEPHERD

Visit of Consultant to House Committee on Science and Astronautics: On November 18, Col. H. A. Gould visited MSFC and was briefed on the status of approved facilities, the performance of maintenance activities, procedures for control of design and construction, and plans for the FY-66 budget. His purpose was to re-establish his understanding of the Apollo program (after his absence from the Committee Staff for one year), and to prepare himself for the hearings next spring. He previously visited MSFC activities at Downey, Seal Beach, Edwards Air Force Base, and Sacramento. He is scheduled for Michoud and MTF on December 15-16.

Col. Gould had no critical comments, and was particularly complimentary of the maintenance costs and procedures presented for Huntsville. ✓

11/23
B 11/22
NOTES 11-23-64 Stuhlinger

1. PEGASUS DATA EVALUATION: The detailed plan for Pegasus Data Evaluation (RPL's responsibility) has been completed. It describes the general procedures and preparations for the acquisition, reduction, evaluation, analysis, and dissemination of the engineering and scientific data to be derived from the Pegasus flights. The detailed program for data reduction and evaluation was prepared and established in cooperation with Computation Laboratory. ✓

2. CIS-LUNAR PEGASUS: Considerable time was spent by members of RPL with the R&DO Cis-Lunar Pegasus Working Group in an effort to establish criteria for a PDP, and for project definition. It appears that this project would require relatively few modifications of the present Pegasus vehicle; most of the changes would concern the electronics systems. As you requested, Dr. Johnson and I prepared a brief presentation to you; we will ask Bonnie for an appointment. ✓

E.S.
I agree,
but let
me know
approx.
date in
advance,
as my
calendar
is
rapidly
filling
B

3. AES SCIENTIFIC SYMPOSIUM: Ed Gray's office is planning to hold a national symposium on the AES Scientific Program early next year, and requested RPL to find out whether MSFC would be willing to act as host. ✓ After checking with PAO (Bart Slattery), I gave an affirmative answer. ✓ We learn now that OMSF is definitely intending to hold this symposium at MSFC, subject, of course, to your approval. ✓ An official request will be forwarded to you from Ed Gray's office (Bill Taylor) in the near future.

The main purposes of the meeting will be to establish a firm and pleasant contact between the lunar scientists in the country and their counterparts in NASA and to inform the scientists of NASA activities and plans for possible extensions of the currently approved Apollo program. ✓

4. NASA - UNIVERSITY RELATIONS: Dr. T. Smull's office hired Dr. D. J. Montgomery from Michigan State University for one year as a successor to Dr. Sidney Roth. Like his predecessor, Dr. Montgomery is to advise NASA on NASA - University relations. He spent two days with us in very fruitful and pleasant talks, and it seems that we agree on the major issues: (1) NASA should do more to support basic research; (2) considerable scientific capabilities exist at the Centers; (3) direct contacts between Center scientists and university scientists should be encouraged. ✓

IF

CM weighs 10,000 #
SM weighs 50,000 # (full)
Total 60,000 #

and if a 2-stage Sat V
can lug 220,000 # payload
(everything above S-II) into a
low orbit; and if all "shells" incl. RCS
weigh another 20,000 #,
then "Space station equipment
module" may still weigh

220,000
- 80,000
140,000 # (incl. RCS)

Sat V conversion
into a S-II
space station
by means of
a cylindrical,
movable
"equipment
module"

WVB

11/20/64

Space station
equipment module
in boost flight position
(Note ideal serviceability
during pre-launch preparations)

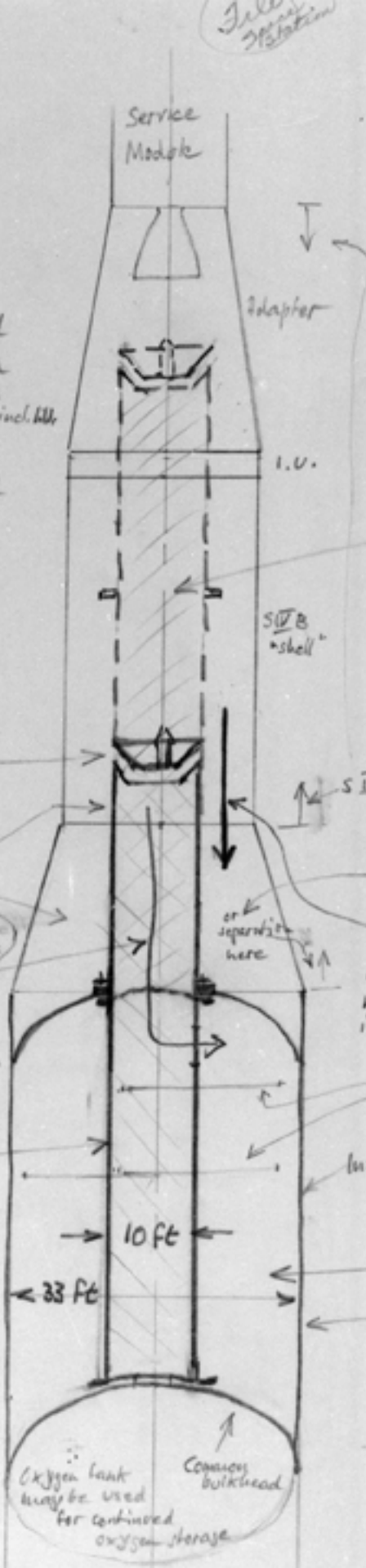
Apollo (or
Gemini)
docking cone.

Room
for
reaction control
system (normal)
SIV B
APU
units, with
extra
tanks)

Room for
antennas, windows,
additional docking cones
etc.

To get from
Apollo or Gemini into
space station, astronauts
pass through this 10 ft tunnel.

Space station
"equipment module" in
final position
(Accommodates environm.
control equipment,
communications equipm.,
research gear,
power supply,
oxygen/water
supply, sanit.
facilities, cooking
equipment, food storage,
radiation "storm" shelter, etc etc)



SIV B "shell", I.U. and adapter
are removed for activation
of S-II stage as
orbital station.

After injection into orbit
and subsequent complete venting
of S-II hydrogen tank, equipment
module is moved (hydraulically?)
into hydrogen tank, converting the
latter into space station.

Expandable platforms (extend
from central module)

Insulated walls

6 ft man

S II stage

S-II surface, covered
with solar cells, can
easily provide 5 kW power,
even if station is not
attitude-stabilized.

Nov 30, 1964

B 12/5

1. FY-65 R&D OPERATIONS' BUDGET REDUCTION: As reported in the attached 11/16/64 NOTES, Industrial Operations had requested a reduction of about \$41M in R&D Operations' FY-65 Budget. \$22M of that amount was distributed to the laboratories, in the November Program Authorization Plan, with the balance to be apportioned later. On November 24, a meeting was held with the laboratory Resources Managers to distribute the remaining reductions in the most equitable manner. These reductions involved \$4.04M Saturn IB funds and \$13.4M Saturn V funds. The laboratory representatives agreed that the reductions could best be distributed by a straight percentage of each laboratory's program. It was also agreed that each laboratory will, by December 2, provide R-RM with identification of the reductions down to system level accounts. Impact statements will be provided, if appropriate.

2. CONTRACTOR PHYSICAL SPACE REQUIREMENTS AT SATURN V BREADBOARD FACILITY: Industrial Operations has requested R&D Operations to provide office space for Boeing personnel adjacent to the Saturn V Breadboard Facility, which is located in the main Quality and Reliability Building #4708. ✓ At a meeting with Mr. Kroeger, on November 25, it was determined that between 50-60 contractor people are involved. ✓ Staff action is continuing to meet this requirement. ✓

3. FY-66 PROGRAM: Of the R&D Operations' portion of the FY-66 CofF Program, there were seven projects, for \$8.174M, submitted by NASA Headquarters to the BOB. The preliminary BOB markup is for four of these R&D Operations-originated projects, totaling \$2.986M. These are the Extension to the Test Engineering Building, Additions to Materials Lab and the Non-Destructive Testing Lab, and the LOX Storage Facility. R&D Operations has provided information to support reclama action for the remaining three projects. ✓

Means should bring details on this plan also about to THE meeting
B
(I'm interested in impact of this reduction on support contracts)

is that a wise decision, or merely a convenient one? B

DIR

Dr. von Braun

R. DIR, Weidner

B
12/28

notes
file

Subject: Your Comments to McCartney's 11/30/64
Notes (Copy attached)

I left the method for finding a distribution key for this reduction entirely to the Program Coordinators (McCartney + one budget representative from each lab). They went into a huddle and came up with this recommendation. The impact statements we have ^{so far} received from the labs do not impress me as being serious yet. Not one lab has suggested reduction of their single support contractor strength. In my opinion, we are not really hurting until we reach this point.

Agree ✓

OFFICE OF DIRECTOR - MSFC

| CODE | NAME | INIT. | <input type="checkbox"/> ACTION | <input type="checkbox"/> INFORMATION |
|------|---------------|-------|---------------------------------|--------------------------------------|
| DIR | Dr. von Braun | | | |
| | | | | |
| | | | | |

REMARKS

SHOW DIRECT

B12/19

Tw 12/15

File 11/30/64 NOTES



| CODE | NAME | DATE |
|-------|------------|---------|
| DEP-A | Mr. Lerman | 12/8/64 |

MSFC - Form 495 (Rev August 1963)

B 12/5

7/14/30

1. MSFC Mississippi Relations Paid Off - Lt. Col. Beatty, MTO Area Engineer, called a few days ago frustrated at overweight penalties being assessed trucks hauling high-pressure storage vessels over the one-fifth mile of Highway 43 from Road J to the haul road leading to the test stand area. Charges per mile were not exorbitant, but state regulations for a fifty mile minimum were enforced which meant over \$670 per vehicle. Beatty had exhausted efforts towards getting a waiver, and asked for our help as well as going to Mobile. B. U. Jones got things straightened out with John Smith, Highway Commissioner for our area, and by early last week construction trucks were able to haul again at reasonable rates, with minor concession that the Corps repair Highway 43 for that stretch, if necessary, until Road A is finished. ✓

2. Attended Administrator's Annual Review of Apollo Programs, Wednesday, November 25, 1964 - with W. B. Kuers, NASA Headquarters personnel and a number of key Department of Defense representatives, who Mr. Webb had invited, listened to the Administrator give a 15-20 minute generalization of NASA's space flight objectives, how much had been accomplished this past year, then General Phillips more detailed coverage of our manned lunar landing endeavor. Presentations by Lee Belew, Lee James and Arthur Rudolph were well received. I sat with Ray Thompson, who reviewed their various vu-graphs for later showing to Congress. Just one or two in each case were considered too-complex or showed too much minutiae for such utilization. Main point of discussion at morning conclusion was contractors reaction to incentivising their contracts. Sam Phillips said NASA was striving real hard for good contract performance and incentive contracts properly written could pay off for both government and contractors. Not being included in the afternoon session, I talked with Bob Freitag and others on MTO subjects. Our name change has not been finalized, being part of an overall NASA activity study, which will not be finalized for some weeks. We probably will remain Mississippi Test Operations, with a notation we are a Class II activity indicating subordinate to MSFC, a Center or Class I activity.

Harry G.

What does that mean? Is there something cooking at HQ re spinning MTO out of MSFC? Has never been discussed with me. B

Added to Fortune - The sentence is not constructed properly - The underlined should be read "which is a Center and a Class I activity" ✓ B



B 12/1

Tw 1/30

* H-1 ENGINE

Outboard Engine H-5022 on Vehicle SA-8 was damaged due to human error during vehicle checkout at Michoud. It is being removed and will be replaced by Engine H-5032. No vehicle schedule impact is expected. ✓

J-2 ENGINE

Two ground test engines should be delivered to S&ID this week for use in their Battleship program.

A flight type production engine is now on the test stand for acceptance testing and subsequent delivery to DAC/SACTO for the S-IVB Battleship program.

A ten second mainstage test is scheduled for tomorrow at DAC/SACTO on the Battleship stand. ✓

RL10 ENGINE

The Centaur AC-4 vehicle (the first two-burn mission) is now scheduled for the second week in December.

We had an 11 1/2 minute firing on the first complete (uprated turbine, high expansion ratio, etc.) RL10 A3-3 engine last week. Total firings are now 10 for 3384 seconds.

Final review of the S-IV-8 acceptance firing data shows no engine related difficulties. ✓

F-1 ENGINE

Two engines are in FRT with completion of the first five safety limits tests on engine 2004 and the first three calibration series tests on engine 2006. (One engine runs limit test and the other performance tests.) To date the only unusual occurrence has been that some baffle erosion has been experienced on the small can baffle of the safety limits engine 2004. The injector has been removed from the engine for detailed inspection at Canoga Park. Resumption of testing on this engine is planned for Tuesday, December 1, 1964, with a replacement injector of the same configuration. It looks like we will be able to complete the FRT in December.

Engine F-2005 is progressing satisfactorily in the Second E&M checkout. On schedule completion is predicted for November 30, 1964. Shipment will be by air to MSFC for S-IC-T late in the first week of December 1964.

Engine F-2007 and F-2008 are at Edwards for acceptance testing. Each executed a full duration firing on November 25, 1964. ✓



B 12/5

Feb 11/30

1. S-IC UMBILICALS: This laboratory has requested Industrial Operations to have lightning ground provisions incorporated on the S-IC stage intertank and aft umbilicals. Since the intertank service arm and the three tail service masts are possible paths for high currents to flow from the launcher umbilical tower to earth in the event of a lightning stroke, this action will increase the reliability of the Saturn V grounding system. ✓

2. RJ-1/SODIUM NITRITE MOBILE SERVICE TRUCK FOR S-IC: Representatives of this laboratory witnessed the factory acceptance tests at Hayes International Corporation in Birmingham. The tests were completed on 11-18-64 and the truck was delivered by MSFC on 11-20-64. The truck is being serviced before the test program begins. ✓

3. S-IC-T PROPULSION SYSTEM COMPONENT QUALIFICATION SURVEY SHOWS APPROXIMATELY 45 PER CENT QUALIFIED (STATUS 11-18-64): The status of the 72 unqualified components is as follows:

- 40 Components: Qualification Mandatory
- 14 Components: Use "As Is"
- 13 Components: Limited Testing Necessary
- 2 Components: Replace When New Parts Available
- 2 Components: Redesigned and Qualification Underway
- 1 Component: Use MSFC Back-up ✓

4. F-1 ENGINE FRT ACTIVITY REPORTED: The Safety Limits Engine (F-2004) demonstrated a safe shutdown under the following conditions:

- a. IMV failing to sense ignition. (Ignition Monitoring Valve)
- b. Delayed Ignition Fuel Valve (IFV) opening.
- c. IFV opening prior to start.
- d. Low engine control pressure at start. Erosion of the injector inner circular baffle was noted following this test. The injector has been removed for further investigation.

Two successful full duration tests were conducted on the Calibration Engine (F-2006). ✓

5. J-2 ENGINE TESTING REPORTED: Informal PFRT was completed on 11-21-64 utilizing Engine J-2008. A total of 15 starts and 2262 seconds has been accumulated on this engine. ✓

Engines J-2004 and J-2010 were acceptance tested and returned to Canoga for the second electrical and mechanical checkout. ✓

6. LONG OPENING TIMES OBSERVED ON TWO H-1 200K MAIN LOX VALVES (MLV's): After testing five MLV's (latest configuration) successfully, two valves experienced opening times of approximately 745 ms (normal: 300-350 ms). Cause of failure is being investigated. ✓

B 12/5

1. GENERAL

A party consisting of General William F. McKee, Assistant Administrator for Management Development, NASA Headquarters, and Mr. Thomas I. Bell, Director, Management Operations Division, Office of Administrator, NASA Headquarters, accompanied by Col. Edmund O'Connor will visit Michoud Operations on December 1, 1964, for a briefing and tour. ✓

2. S-IC

Bulkhead Fabrication - The forward LOX tank bulkhead was completed over the weekend. The quality of the last few welds appears greatly improved, and it appears that considerable progress in improving weld techniques has been made. ME Lab assistance has been substantial. ✓

3. S-I/IB

SA-8 - The thrust chamber of No. 4 engine was damaged when a mechanic installing safety wire dropped a pair of pliers due to a minor injury to his hand. The engine will be removed and replaced with an "on-hand" spare, and sent to Rocketdyne for repair to the thrust chamber tubing. ✓

SA-201 - (Reference: Notes 11-16-64 Cline) The SA-201 Vehicle/Launch Complex Composite Mechanical Schematic errors fall into the category of missing or information changed by the issue date of the schematic. In developing the schematic Chrysler had proceeded on the ground rule that the composite schematic must be compatible with the other 10 volumes of the Vehicle/Launch Complex Functional Description. As a result, the schematic reflects information available as of the earlier cutoff date for the functional description. In the future, the composite schematic will be a separate entity, maintained up-to-date by EO's through launch. ✓

July
30

B 12/5

NOTES 11-30-64 DANNENBERG

1. Saturn IB/Centaur/Pegasus - Project Proposal and Approval Document were prepared for Dr. Mueller on 11-21-64, which combined the Saturn IB/Centaur R&D project and a two-flight Cislunar Pegasus program into one project priced at \$86M, as part of the Apollo Program. ✓ This includes \$56M for shroud and Centaur R&D, Saturn IB/Centaur adaptation, and a single launch pad modification; \$10.4M for the purchase of 3 Pegasi (one ground test, two flight); and \$19.6M for the purchase, payload integration and launch services of 2 modified Centaur stages and shrouds. This project was to have been presented by Dr. Mueller to Dr. Seamans for approval during the week of 11-22-64. R-SA has received no word of the outcome. O SSA and OART were both against this method of getting approval for these projects. I know!
B

2. Data Management - IO, Central Staff, and R-SA agreed to transfer the technical supervision of the GE support for Data Management to IO. ✓

NOTES 11-30-64 FORTUNE

B 12/5

1. MSFC Mississippi Relations Paid Off - Lt. Col. Beatty, MTO Area Engineer, called a few days ago frustrated at overweight penalties being assessed trucks hauling high-pressure storage vessels over the one-fifth mile of Highway 43 from Road J to the haul road leading to the test stand area. Charges per mile were not exorbitant, but state regulations for a fifty mile minimum were enforced which meant over \$670 per vehicle. Beatty had exhausted efforts towards getting a waiver, and asked for our help as well as going to Mobile. B. U. Jones got things straightened out with John Smith, Highway Commissioner for our area, and by early last week construction trucks were able to haul again at reasonable rates, with minor concession that the Corps repair Highway 43 for that stretch, if necessary, until Road A is finished. ✓

2. Attended Administrator's Annual Review of Apollo Programs, Wednesday, November 25, 1964 - with W. B. Kuers, NASA Headquarters personnel and a number of key Department of Defense representatives, who Mr. Webb had invited, listened to the Administrator give a 15-20 minute generalization of NASA's space flight objectives, how much had been accomplished this past year, then General Phillips more detailed coverage of our manned lunar landing endeavor. Presentations by Lee Belew, Lee James and Arthur Rudolph were well received. I sat with Ray Thompson, who reviewed their various vu-graphs for later showing to Congress. Just one or two in each case were considered too-complex or showed too much minutiae for such utilization. Main point of discussion at morning conclusion was contractors reaction to incentivising their contracts. Sam Phillips said NASA was striving real hard for good contract performance and incentive contracts properly written could pay off for both government and contractors. Not being included in the afternoon session, I talked with Bob Freitag and others on MTO subjects. Our name change has not been finalized, being part of an overall NASA activity study, which will not be finalized for some weeks. We probably will remain Mississippi Test Operations, with a notation we are a Class II activity indicating subordinate to MSFC, a Center or Class I activity.

Harry G. ↗

What does that mean? Is there something cooking at HQ re spinning MTO out of MSFC? Has never been discussed to me.

B

answered on Dec 1/35
copy by Mr. Hansen
Curt

B 12/5

7
11
30

1. Cislunar Pegasus - Contractor Involvement: Re: your question on item 3, Notes 11/16/64 Geissler, copy attached: The guidelines from Gen. Phillips state that a Pegasus C type spacecraft shall be procured from Fairchild and modified for cislunar use. The study program now underway will determine the practicability of this approach over an entirely new spacecraft. In either case, the program is carefully oriented to permit us to select any contractor we desire or MSFC to modify the present Pegasus, or to design and build a new spacecraft if this approach is chosen. ✓

2. Saturn IB/Centaur/Voyager: Mr. de Fries visited JPL last week and found this latest information: The RFQ for Voyager was being printed and was to be sent out to industry this week or next week. The RFQ specifies flights in 1969 on Atlas/Centaur with Voyager Subsystems and components and in 1971 a real Voyager on the IB/Centaur to Mars.

we should try to get these on IB for

3. CCSD Quarterly Review: The Chrysler Corporation Space Division (CCSD) Aeroballistics first Quarterly Review for FY '65 was held at MSFC on November 24, 1964. The Review covered summaries of the Aeroballistics technical analyses conducted during the reporting period. CCSD is now on-board in all technical areas and most of the analyses are progressing smoothly. ✓ With the exception of the Flight Mechanics Area (33 current versus 45 authorized), CCSD manpower has built to that authorized by MSFC. ✓

Frank G.

→ We are rapidly losing our last chance to be ready for a 1969 launch, since project approval isn't forthcoming. B

NOTES 11-30-64 GRAU

B_{12/5}

1. S-IU-8 INSTRUMENT UNIT CHECKOUT: The S-IU-8 Instrument Unit was released to systems checkout November 23, 1964. The adjusted checkout schedule, providing for eight (8) hours a day and five (5) days a week, allows Laboratory release of the Unit on January 8, 1964. This delay from the original release date of December 27, 1964, is presently being coordinated. ✓
2. S-IVB PROGRAM: The S-IVB Battleship was static fired for 185 milliseconds on November 24, 1964. No discrepancies were noted. Preparations are now underway for a 10 second static firing scheduled for December 1, 1964. ✓
3. DOCUMENTATION REVIEW: This Laboratory has completed the tasks associated with the review, for compliance with NASA specifications, of the 182 Procurement Specifications submitted by NAA. The review of 115 S-IV Component and Subsystems Qualification Test Reports submitted by DAC was also completed. ✓

No submission this week.

W.H.

I guess I haven't had any
notes from Astionics for 3
or 4 weeks. Have you stopped
working, has your place burned down,
or is it that you simply have
no problems? B

B 12/5

1. S-II BATTLESHIP

A 10-second mainstage test was attempted on the S-II battleship on Thanksgiving Day, 11/26, at 10:08 a.m. (PST). Top S&ID management ordered that this test be carried out rather than shut down for the holiday as previously agreed between S&ID and NASA. The test was performed after approximately 34 hours of continuous operation by the test operations crew. We consider this to be a bad situation, very similar to past experience with DAC on the S-IV All Systems. ✓

E. Neubert

2. S-IVB BATTLESHIP

On 11/23/64, DAC conducted a successful test with the cutoff being initiated 185 milliseconds after mainstage control signal. ✓

According to tentative plans, a 10-second test will be conducted on Tuesday, 12/1/64. If this test is successful, a 20-second test is scheduled for Saturday, 12/5/64. ✓

3. F-1 ENGINE

Test TWF-039 was conducted on 11/23/64, with a mainstage duration of 9.93 seconds. There was no facility or apparent engine damage.

As part of a program to evaluate the injector cracking problem, the main injector was cleaned, after test TWF-039, in preparation to dye checking the fuel and lox rings. Several cracks were discovered, prior to dye checking, which were similar to the ones found on injectors from F-1001 and F-1002. If the dye check proves that the injector is damaged as severely as suspected, the engine will be removed. This injector has been subjected to six tests, with a total mainstage time of 396 seconds at the STTW. At this time, it is not known if engine F-1002-1 will be rebuilt with a block II injector, or if F-1 engine F-1005 will be installed. ✓

4. LC-39 LUT HOLDDOWN ARM

The first LC-39 LUT holddown arm was recieved from KSC at Test Laboratory on 11/2, and the arm has been installed in its test fixture at the Saturn V GSE test facility. Before the arm can be load tested, the tie-down bolts must be torqued to 7,500 ft. lbs. This requires a special wrench, which was to be supplied by KSC. The wrench is being fabricated by Test Laboratory. While waiting for this wrench, some preliminary tests can be run. ✓

5. TRANSPORTATION

YFNB 20: West Coast barge, Palomar, named after the observatory on Mt. Palomar, California, will be in service 12/21/64. Shipyard work is nearing completion. Drydocking is scheduled for the week of 12/14/64.

John Goodrum, I.O.I.

Palomar vs Palaemon
What a source of confusion!

B

fw
11/
30

NOTES 11-30-64 HOELZER

B_{12/5}

Negative Report

NOTES 11/30/64 JAMES

B12/5

11/30

*fw

PEGASUS:

Pegasus "A" Electronic Canister Test - Thermal/vacuum test of the canister has started at Bladensburg. This test should be completed by the end of this week, at which time the canister will be shipped to Hagerstown for assembly into the spacecraft structure. ✓

Detector Panels - Schjeldahl is now successfully bonding acceptable .0015 inch detector panels. All panels for Pegasus "A" should be delivered to Fairchild this week. Formal qualification testing of detector panels by Schjeldahl started 11/25/64. ✓

Shipment of Dynamic Test Model to KSC - Plans for shipment of the DTM to KSC are proceeding on schedule. Off-loading at KSC should be accomplished approximately 12/4/64. ✓

SATURN IB STRUCTURAL LOAD CRITERIA: A request has been received from P&VE to direct CCSD to revert back to a set of loads criteria which were imposed in November 1963 and changed in August 1964. We have met with CCSD to discuss the impact of such an action. CCSD indicated that this would affect flight hardware delivery, qualification test procedures and fixtures. Their estimate of the overall schedule impact on the S-IB-3 was that a two month delay in delivery would result. We have requested CCSD to prepare firm cost and schedule impact of this change considering effectivity on S-IB-3, 4 and 5.

Fred
Cline
→
Quack's
behind
this
request?
B

*fw

S-IVB BATTLESHIP: A successful gas generator ignition test of the S-IVB Battleship was performed 11/24. Test duration was 185 m. s. from the mainstage control solenoid valve energized signal, at which time cutoff was automatically initiated by a timer (approximately 1.5 seconds from start command to cutoff). No major problems are apparent from a quick look at the data. A 10 second mainstage firing test is planned for Tuesday, 12/1/64 and a 20 second firing test is tentatively planned for Saturday, 12/5/64. ✓

RCA 110 COMPUTERS: The first computer is currently 7 weeks behind schedule and computers 2 through 7 are approximately 2 weeks behind schedule. These schedules are slipping on a day-to-day basis until design problems are corrected in the analog subsystem. Computers 3, 4 and 5 are allocated to Saturn IB. Program impacts are being assessed and will be reported next week. ✓

SATURN IB SYSTEMS DESIGN REVIEW: Saturn IB Systems Design Review is scheduled for Wednesday, 12/2/64, at 9:00 a. m. in the Center Conference Room, 4200. A summary is scheduled for you at 3:00 p. m. ✓

SA-206 LEM ALONE MISSION: Headquarters has stated that this mission will not be included in the Flight Mission Assignment Document until it is approved by the Centers. This will be discussed at the Design Review Wednesday, 12/2/64. (DR. MRAZEK) ✓

Jul 11/30

NOTES 11-30-64 Koelle

B_{12/5}

MSFC FUTURE PROJECTS GROUP: Since you appointed this group about two months ago, its 13 members have met on a bi-weekly basis and attempted to come to a meeting of the minds on what the problem really is that we are supposed to solve, and how to go about solving it. It was not easy to come to a consensus of opinion because of various Headquarter and Center management inputs, which have varied as a function of time and of sources. However, we have made some progress (we believe) and I would like to find out through these NOTES whether we are on the right track. We think there are four problem areas for which we will attempt to develop solution alternatives for the MSFC Board of Directors:

1. Definition of Missions and Experiments for Flights within the Planned AES Program through 1971

In this area, my working group will support Dr. Kuettner and Mr. deFries who were charged earlier with the responsibility to define the MSFC participation. We will primarily address ourselves to the question of how these early flights can be used in support of future projects after 1971. ✓

2. Definition of Missions for Saturn IB and Saturn V Launch Vehicles (and modifications thereof) for the Time after 1971

In this area, we will try to identify justifiable "bread and butter" projects with preference for near Earth applications. The goal is the support of a firing rate of 6 per year for each vehicle. ✓

3. Other New Project Starts Outside the Saturn Program

In this area we will list all candidate projects, define them in some detail, and attempt to rank them in order of preference from the national and MSFC viewpoints. ✓

4. Implications of New Project Starts on the Development of MSFC As a Center

Some assessment seems to be desirable on what possible impact various new project starts might have on MSFC. A projection of the expected Center evolutionary process will be attempted to offer a basis for facility planning and shift of personnel and skills. ✓

Presently, we are planning to have a staff paper ready in August - in time to attempt to influence the FY 1967 budget. We hope to be able to give our next status report to the Board in February. Does this tentative working plan meet with your approval?

HHK

→ Yes, I think we are pretty much eye to eye. However, in view of the continuously changing inputs I get from Washington, and a certain degree of general uncertainty as to what rate Pres. Johnson will be ready to support the NASA FY66 Budget, I suggest that we touch base at least once a month. B_{12/5}

NOTES 11-30-64 KUERS

B 12/5

1. Manufacturing Milestones Accomplished:

a. S-IC-T: The Thrust Structure--although incomplete with respect to systems installation--has been moved into the tower building and joined with the Fuel Container. At this station, the suction lines will be installed into the Lox Tunnels, and this unit will be painted while installation of ducts, tubing, and miscellaneous components into the Thrust Structure is being continued. ✓

b. S-IC-S: The welding of the upper Lox Dome which had been scrapped at Michoud has now been completed in our shop. This is the 13th bulkhead successfully manufactured here. The pipelines in structural fabrication are really filling up. We have agreed with Boeing to manufacture some additional upper Lox Domes for -D, -1, -2, and -3 in our shops in order to speed up the fabrication program. Boeing has meanwhile succeeded to weld successfully the first bulkhead for the -D vehicle. ✓

c. The assembly of the I.U. 200 V has been completed for delivery to the Wyle Laboratory for vibrative testing. ✓

2. Electron Beam Welding of Y-Rings: Boeing got interested in our development of this process. ✓ They have submitted an informal proposal to weld the billet segments by this method with an understanding of possible later use for welding of machined segments, pending an investigation on how Y-ring segments could be most economically machined on numerically controlled milling machines. We have offered to transfer our special built EB welding equipment with the split vacuum chamber to Michoud. ✓ Welding of the billets by the EB process will without doubt result in a more reliable and stronger joint and will reduce welding time for one ring from 8 days to 1 day. ✓

3. Problem with Helium Bottles: During proof pressure testing of Helium Bottles at Martin, the bottle volume increased above specification requirements. Various investigations and analysis were conducted during the past several weeks, and it was concluded that the heat treat process had varied causing a loss in material strength. All S-IC-D bottles at Michoud and bottles at MSFC will be returned to Martin for hardness tests and if necessary a re-heat treat cycle. Bottles in S-IC-T should not be affected since they were made from the same lot as the qualification bottles which passed all tests successfully. ✓

B 12/5

11/30

1. NATIONAL LAUNCH VEHICLE STUDY - Final report on the cost portion of the National Launch Vehicle Study is scheduled to be completed on December 4. A date for presentation to AACB has not been set; earliest probable date is December 14, 1964.
2. APOLLO EXTENSIONS SUPPORT (AES) - During final preparation of NASA FY66 Budget the AES plan as proposed by the Ad Hoc Committee was modified by Dee Wyatt's office. The modifications include slippage of Saturn IB/Centaur and Pegasus development, and assignment of the Cislunar Pegasus to OART.

HM
Can we get a copy by 2 or 8 Dec for command? if appropriate for would be very helpful indeed B

Dr. Mueller strongly objects to these changes and is preparing a reclama. He plans to (1) submit an AES proposal as proposed by the Ad Hoc Committee with only minor changes, (2) submit a proposal on Saturn IB/Centaur/Pegasus, essentially the same as that worked up by MSFC except that the second pad, and associated GSE at AMR, are deleted. The combination of the Centaur development and Cislunar Pegasus development into one project proposal is to strengthen Dr. Mueller's contention that they should be tied together, and that both should be part of the nominal MLL Program. ✓ Along with the above, Dr. Mueller also plans to submit a Gemini land landing project proposal. ✓

3. PRESIDENT'S REPORTS SURVEY - The President's Report Survey which was initiated by President Johnson on March 10, 1964, has been completed by MSFC. This was a joint effort between Executive Staff, IO, Management Services, and R&DO. The net results of the survey are:

| | |
|------------------------------|-------|
| Total Reports Considered | 737 |
| Number of Reports Eliminated | 51 ✓ |
| Number of Reports Simplified | 86 ✓ |
| Number of Reports Continued | 600 ✓ |

4. SPECIAL MANPOWER REPORT - Last Friday we received one more in the continuing stream of requests for manpower reports and forecasts. This one is due in Manned Space Flight December 7, 1964. It requires total authorized and assigned civil service personnel by project/program code and NASA duty code for the major MSFC projects. Also, required is a five-year projection of civil service manpower requirements by major MSFC project starting with FY65, with end of year requirements through 1969. ✓

Frank W.
Please ask Maus to bring pertinent material along to THE meeting B

Feb 4/30

B 12/5

NOTES 11/30/64 McCartney

Frank G.

Means should bring details on this plan also along to THE meeting B
(I'm interested in impact of this reduction on support contracts)

1. FY-65 R&D OPERATIONS' BUDGET REDUCTION: As reported in the attached 11/16/64 NOTES, Industrial Operations had requested a reduction of about \$41M in R&D Operations' FY-65 Budget. \$22M of that amount was distributed to the laboratories, in the November Program Authorization Plan, with the balance to be apportioned later. On November 24, a meeting was held with the laboratory Resources Managers to distribute the remaining reductions in the most equitable manner. These reductions involved \$4.04M Saturn IB funds and \$13.4M Saturn V funds. The laboratory representatives agreed that the reductions could best be distributed by a straight percentage of each laboratory's program. It was also agreed that each laboratory will, by December 2, provide R-RM with identification of the reductions down to system level accounts. Impact statements will be provided, if appropriate.

Is that a wise decision, or merely a convenient one? B

2. CONTRACTOR PHYSICAL SPACE REQUIREMENTS AT SATURN V BREADBOARD FACILITY: Industrial Operations has requested R&D Operations to provide office space for Boeing personnel adjacent to the Saturn V Breadboard Facility, which is located in the main Quality and Reliability Building #4708. ✓ At a meeting with Mr. Kroeger, on November 25, it was determined that between 50-60 contractor people are involved. ✓ Staff action is continuing to meet this requirement. ✓

3. FY-66 PROGRAM: Of the R&D Operations' portion of the FY-66 Coff Program, there were seven projects, for \$8.174M, submitted by NASA Headquarters to the BOB. The preliminary BOB markup is for four of these R&D Operations-originated projects, totaling \$2.986M. These are the Extension to the Test Engineering Building, Additions to Materials Lab and the Non-Destructive Testing Lab, and the LOX Storage Facility. R&D Operations has provided information to support reclama action for the remaining three projects. ✓

70-30
B_{12/5}

NOTES 11/30/64 RUDOLPH

1. Saturn V Dynamic Vehicle Test Program - Agreement was reached with The Boeing Company on the Saturn V Dynamic Vehicle Test Program, Phase I (Planning and Preparation), statement of work and the direct labor. ✓
2. S-IC Stage Bulkhead Assembly - A joint Boeing/MSFC decision has been made to assemble the forward LOX bulkhead for the S-IC-1 and -2 at MSFC ME Laboratory rather than Boeing Michoud. Boeing has also requested MSFC assistance in assembling some of the bulkheads for the -D and -F vehicles. This request is being seriously evaluated by the ME Laboratory. ✓
3. S&ID Manpower and Activity Survey - Action is underway to finalize the S&ID Manpower and Activity Survey started in November 1964. For this purpose a special group, with Mr. C. Andressen, E-DIR, as Chairman, has been established. ✓
4. S-II Battleship Status - The second S-II Battleship test (transition) was successfully completed on Saturday, November 21, 1964. This test was similar to the one conducted by S-IVB in which a failure occurred in the Gas Generator. The total duration of the test was 180 milliseconds. Based on success of the above test and success of the S-IVB transition test on November 24, 1964, an attempt was made on November 26, 1964 to fire the single engine battleship for 10 seconds mainstage. A cutoff was called during transition due to a fuel turbine inlet over-temperature and over-pressure. No damage was visually apparent. A review of data is in process and a more detailed report regarding the cause of failure will be made later today, November 30, 1964. ✓
5. Instrument Unit:

 Test Program - The IU test vehicle 200V for vibration testing has been completed and will be shipped today, November 30, 1964, to the test contractor, Wyle Laboratories of Huntsville. ✓

 Guidance Computer - Breadboard No. 2 Guidance Computer, manufactured by IBM-Owego, was delivered to MSFC, November 23, 1964. This delivery, which was incentivised, was 30 days late. Additionally, to prevent even further delays, the computer was delivered with one memory module instead of two. The second memory module will be retrofitted in January 1965. This reduced capability will not seriously hamper the use of the machine for developing prelaunch computer programs. ✓

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NOTES 11-30-64-SHEPHERD

B_{12/5}

No Notes

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B 12/5

NOTES - STUHLINGER
11-30-64

1. RESEARCH BUILDING: Facilities Office informed us that the RPL building was cancelled from the FY-66 budget by the Bureau of the Budget. The primary argument was that MSFC was so large already that the research could be done in existing facilities. We prepared a reclama which was forwarded to Washington through the Facilities Office. ✓

2. TABAKA COMMITTEE: Mr. Tabaka met with me and my associates to give us a review of his work within RPL prior to our evaluating his findings. We will report our comments within a week. ✓

3. SOURCE EVALUATION BOARD MEETING: RPL's RFQ for contractor support drew 17 bids. After thorough evaluation by RPL, we met with the Source Evaluation Board for a joint appraisal of the bids. At least 6 companies appear acceptable as support contractors. ✓